PB89-206239

Superfund Record of Decision (EPA Region 5): Fort Wayne Reduction Fort Wayne, Indiana (First Remedial Action) August 1988

(U.S.) Environmental Protection Agency, Washington, DC

28 Aug 88

U.S. Department of Commerce
National Technical Information Service
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SUPERFUND RECORD OF DECISION
Fort Wayne Reduction, IN
First Remedial Action - Final

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401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 35-acre Fort Wayne site (FW) is a former municipal landfill/waste disposal facility located along the Maumee River just east of the city of Fort Wayne, Allen County, Indiana. Two onsite areas are designated as wetlands. In addition, the site lies within a 100-year flood plain. The primary land use in the general area is light industrial and commercial. In addition, other landfills, a wastewater treatment plant, and sludge drying beds are located along the Maumee River in the vicinity of the site. Two residential communities are located approximately one-half mile from the site. Before 1967, the site was uncultivated farmland often used for the dumping of unknown waste. The site accepted residential and industrial wastes from 1967 to 1976. Few records were kept on the volume and composition of wastes, or on the industries that generated the wastes. From May 1967 to August 1970, FW was issued a county permit for public disposal of garbage and rubbish. Wastes were incinerated and the residual ash disposed of onsite. In 1970, FW changed its name to National Recycling Corporation (NRC) and built a recycling plant which apparently became inactive after February 1975. All solid waste was to be processed through the plant. It was torn down in 1985. Inspection reports indicated that deposited refuse included: industrial and liquid wastes, municipal wastes, garbage, paper, and wood. A 40- to 60-foot diameter pit (See Attached Sheet)

cont'd pg 1.a

17. Document Analysis a. Descriptors
Record of Decision
Fort Wayne Reduction, IN
First Remedial Action - Final
Contaminated Media: gw, soil
Key Contaminants: metals, organics (phenols, PCBs, PAHs), VOCs

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

vailability Statement	19. Security Class (This Report) None	21. No. of Pages 137
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R05-88/075
Fort Wayne Reduction, IN
First Remedial Action - Final

con't from p. i

16. ABSTRACT (continued)

adjacent to the Maumee River contained pools of volatile liquids. Wastes were disposed of into the pit by cutting off the drum tops and emptying the contents into the pit. There were no records indicating exactly what was dumped into the pit. NRC operation became part of Service Corporation America (SCA) in 1973. In 1974, SCA was denied a municipal refuse permit due to site closure problems encountered following high water levels. Hazard Ranking System records indicate the entire site's waste quantity was equivalent to 2,820 fifty-gallon barrels. In 1984, Waste Management Inc. (WMI) acquired SCA and conducted an initial site investigation. The site has been inactive since 1976. The site consists of two characteristically different areas reflecting its historical use: the eastern half of the site was used as the municipal/general refuse landfill (approximately 15 acres), and the western half of the site (approximately 5 acres) was used for disposal of industrial wastes, building debris, barrels of unidentified wastes, and residual ash from earlier incineration operations. Presently, soil and ground water are contaminated with 43 chemicals of concern including: metals, organics, PCBs, PAHs, phenols, and VOCs.

The selected remedial action for the eastern portion of the site includes: deed and access restrictions; soil capping consistent with State solid waste closure requirements; and long-term ground water monitoring. The selected remedial action for the western portion includes: excavation, re-consolidation, and on- or offsite incineration of approximately measures for the portions of the site within the 100-year floodplain; and compensation for any loss of wetlands due to remedy construction by enhancing onsite wetlands. The estimated present worth cost for this remedial action is $10,020,000.

ATTENTION

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Remedial Response

EPA/ROD/R05-88/075
August 1988

PB89-206239

EPA

Superfund Record of Decision:

Fort Wayne Reduction, IN

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U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Fort Wayne Reduction
Fort Wayne, Indiana

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the Fort Wayne Reduction site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based upon the contents of the administrative record for the Fort Wayne Reduction site. The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

The State of Indiana, through the Department of Environmental Management, concurs with the selected remedy.

DESCRIPTION OF THE REMEDY

This final remedy addresses the contamination present at the site by eliminating, reducing or controlling the risks posed by the site through treatment, and engineering and institutional controls.

The major components of the selected remedy include:

- Excavate the area defined as Area C in the western portion of the site to remove an estimated 4,600 drums containing liquids.
- Incinerate drum contents.
- Reconsolidate the soils and waste excavated during the drum removal.
- Install and maintain a groundwater collection system on the western portion of the site to protect the Maumee River from the migration of contaminated groundwater into the Maumee river at unprotective levels.
- Provide for the removal of contaminants from the collected groundwater through treatment, if necessary.

- Install and maintain a soil cover compliant with the "hybrid" closure requirements outlined in the Record of Decision Summary on the western portion of the site.
- Install and maintain a soil cover compliant with Indiana Subtitle D - solid waste landfill closure requirements over the eastern portion of the site to prevent erosion that could result in a direct contact threat, or washout of the wastes into the Maumee River.
- Monitor groundwater on the eastern portion of the site to ensure that any contaminants present do not pose a threat to the Maumee River in the future.
- Install and maintain a fence around the site, except along the river, to protect the soil covers and restrict public access to the site.
- Limit both present and future use of the site and limit the installation of wells on the site, through deed restrictions.
- Provide and maintain flood protection measures for that portion of the site within the 100-year floodplain.
- Compensate for any loss of wetlands due to remedy construction by enhancing an on-site wetland.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted no less often than every 5 years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

8/26/88
Date

Frank M. Covington
for Valdas V. Adamkus
Regional Administrator
Region V

RECORD OF DECISION SUMMARY
FORT WAYNE REDUCTION

I. SITE DESCRIPTION

The Fort Wayne Reduction site is just east of the City of Fort Wayne in Allen County, Indiana, approximately 1.1 miles east of the U.S. Highway 30 and the Maumee River intersection. The communities of River Haven and Sunnymede Woods are approximately one half of a mile east and south of the site respectively (Figure 1).

The 35-acre site is bordered by the Maumee River to the north, the Norfolk and Western Railroad to the south, Dager Auto Parts and Martin Landfill to the west, and Herber Drain to the east.

The primary land use in the general area of the site is light industry and commercial. In addition, other abandoned landfills and the wastewater treatment plant and sludge drying beds are located along the Maumee River in the vicinity of the Fort Wayne Reduction site.

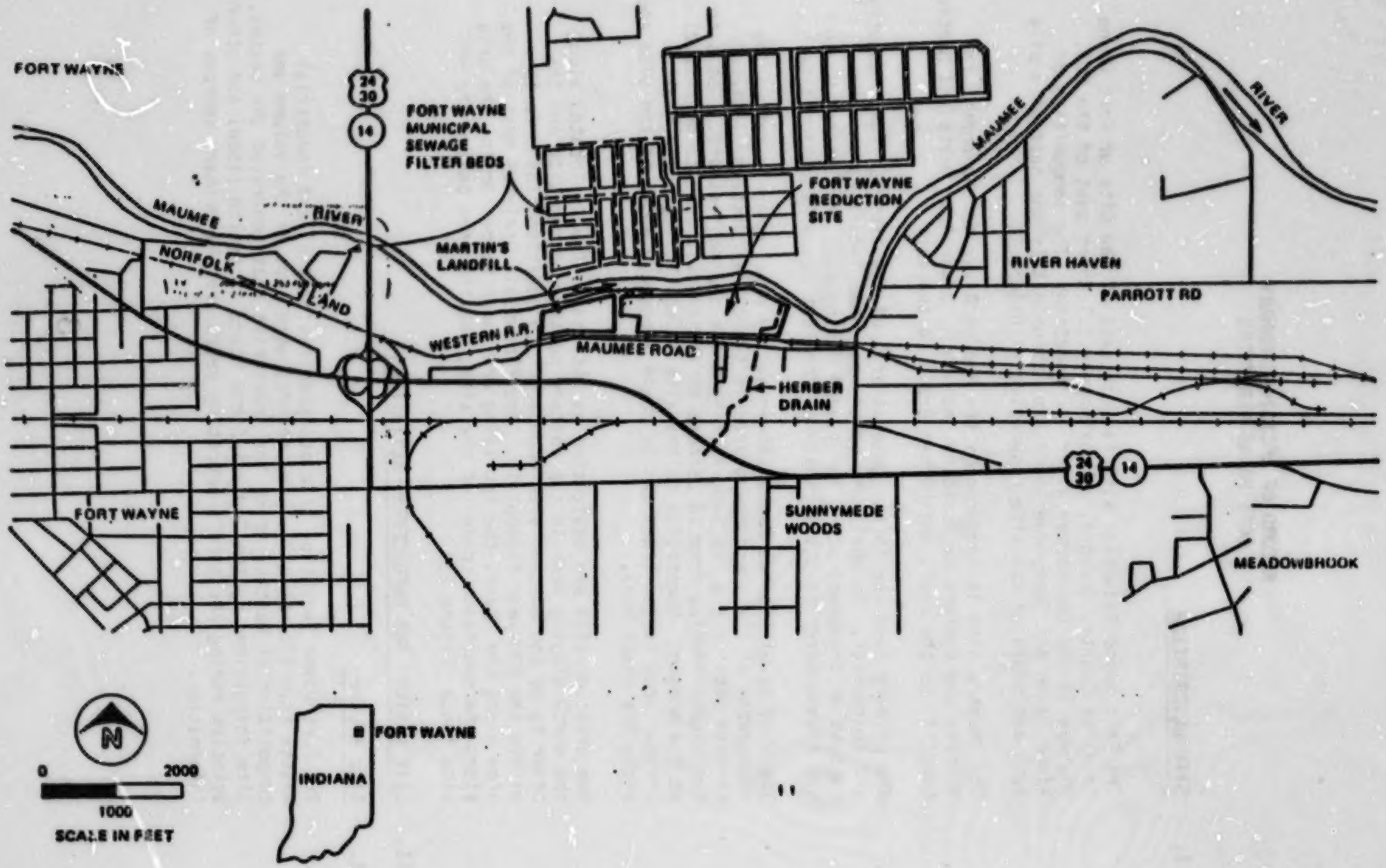
The site is within the Maumee River valley physiographic unit. The topography of the surrounding area is typical midwestern glaciated terrain with only a few low, rolling hills and depressions. The site has slopes ranging from 18 percent at the eastern edge to near level at the middle. Vegetation on the site is mostly grass and small brush. Some larger trees can be found along the edges of the site and along the river bank.

Two areas on-site are designated as wetlands. One is located along the north sloping bank in the eastern portion of the site and the other is at the eastern site boundary. In addition, the site is within the 100-year floodplain. The floodplain includes most of the area along the river, the low lying area near Herber Drain, the area along the southeast corner of the site, and the area behind the on-site fence (Figure 2).

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

The Fort Wayne Reduction site accepted residential and industrial wastes from 1967 to 1976. Few records were kept on the volume and composition of wastes, or on the industries that generated the wastes. Site inspections by the Indiana State Board of Health (ISBH) and other agencies during the site's operating years are the primary sources of information.


FORT WAYNE
24
30
14
FORT WAYNE
MUNICIPAL
SEWAGE
FILTER BEDS
MAUMEE
RIVER
NORFOLK
LAND
MARTIN'S
LANDFILL
FORT WAYNE
REDUCTION
SITE
MAUMEE
RIVER
RIVER HAVEN
PARROTT RD
WESTERN R.R.
MAUMEE ROAD
HERBER
DRAIN
24
30
14
FORT WAYNE
SUNNYMEDE
WOODS
MEADOWBROOK
N
0
2000
1000
SCALE IN FEET
FORT WAYNE
INDIANA

SOURCE: Fort Wayne East USGS Quadrangle map.

FIGURE 1
LOCATIO[illegible]AP
FT. WAYNE [illegible]UCTION FS

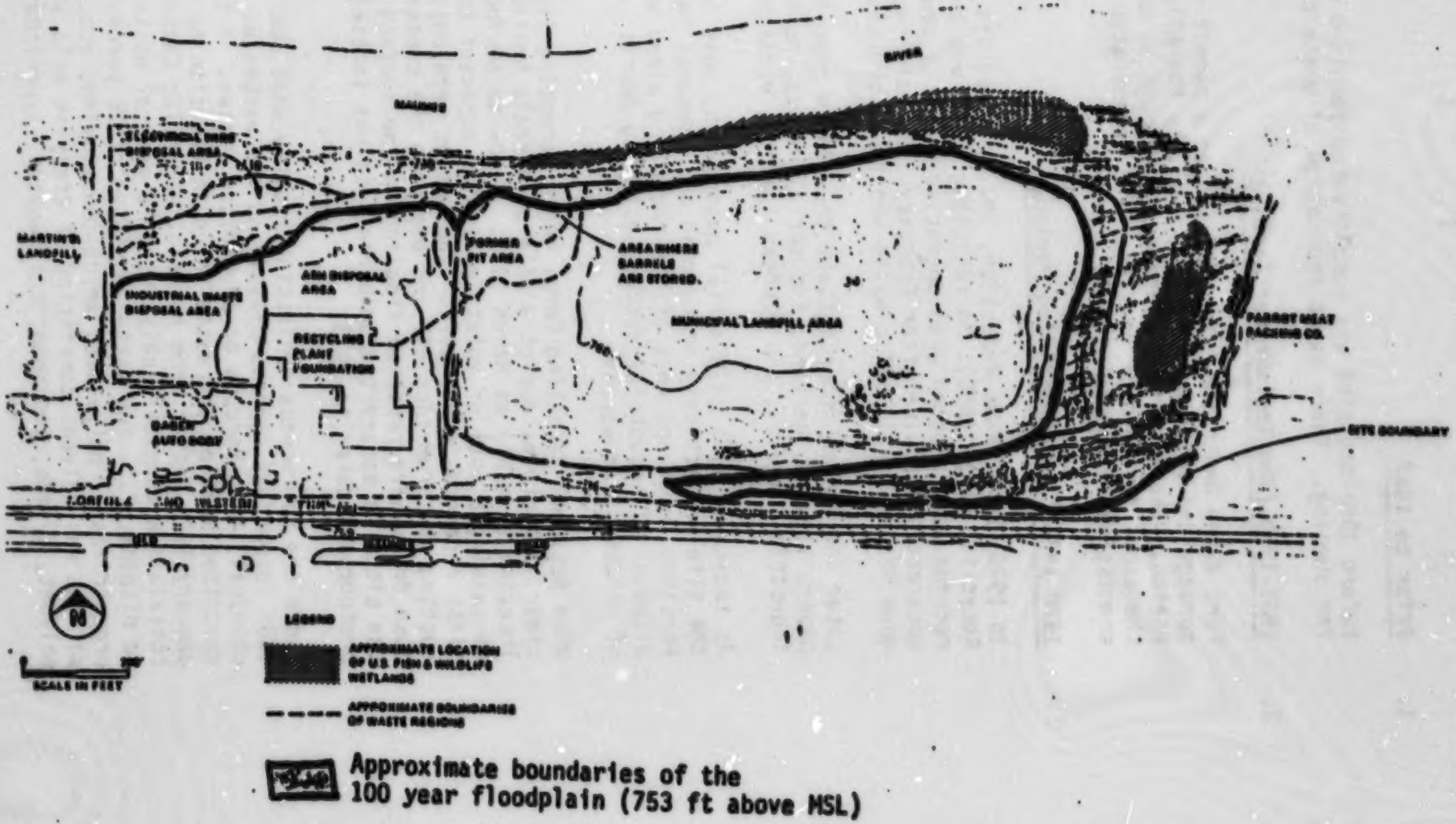

RIVER
MARINE
ELECTRICAL WIRE DISPOSAL AREA
MARTIN'S LANDFILL
INDUSTRIAL WASTE DISPOSAL AREA
ASH DISPOSAL AREA
RECYCLING PLANT FOUNDATION
FORMER PIT AREA
AREA WHERE BARRELS ARE STORED.
MUNICIPAL LANDFILL AREA
BAKER AUTO BODY
PARROT MEAT PACKING CO.
SITE BOUNDARY
LORFIELD AND WESTERN
N
SCALE IN FEET
LEGEND
APPROXIMATE LOCATION OF U.S. FISH & WILDLIFE WETLANDS
APPROXIMATE BOUNDARIES OF WASTE REGIONS
Approximate boundaries of the 100 year floodplain (753 ft above MSL)

FIGURE 2
SITE MAP
FT WAYNE REDUCTION

1. Prior to 1967

Before 1967 the site was uncultivated farmland which was often used for dumping. There is no indication of waste types dumped.

2. 1967-1970 (The Incinerator Period)

Fort Wayne Reduction, Inc. was issued a permit for public disposal of garbage and rubbish on May 17, 1967, by the Allen County Board of Health. The wastes were processed through an on-site incinerator with the ashes disposed of on-site. The incinerator was put out of commission in August 1970.

3. 1970-1975 (The Landfilling Period)

In 1970, Fort Wayne Reduction, Inc. changed its name to National Recycling Corp. (NRC). A recycling plant was built, however, no records were kept on when operating began or ended. The plant was apparently inactive after February 1975, and the buildings were torn down in 1985. All solid waste was to be processed through the plant.

Later inspection reports state the refuse deposited included wood, paper, liquids, garbage, industrial wastes, municipal wastes, industrial liquids, and sludges (paints, varnishes, etc.).

As indicated by a 1973 aerial photograph, most of the eastern half of the site was actively being used as a general refuse landfill. Portions north and west of the recycling plant were utilized for disposal of industrial wastes, building debris, and occasional barrels of unidentified wastes.

When National Recycling Corp. began accepting liquid waste is not clear, but photos depict a pile of barrels behind the incineration location as early as March 1971. A 40- to 60-foot-diameter pit containing a pool of volatile liquids adjacent to the Maumee River was first reported in May 1972. The wastes were deposited into the pit by cutting the drum tops off and emptying the contents into the pit. Some drums were reported floating on the surface of the solvents in the pit. An apparent drum burial pit was located on aerial photographs taken in 1973.

There are no records indicating exactly what was dumped into the pit. ISBH inspection reports classified the wastes as volatile liquids, chemical, or hazardous or prohibited wastes. A former waste hauler described some of the waste taken to the site as "acidic material." A January 1975 letter from National Recycling Corporation to the ISBH contained a chemical analysis of "a general waste which I would like to dispose of." The waste consisted of 25 percent to 30 percent organic resin, polyester, amide-imide nylon, etc. The remaining 70 percent was solvent consisting of cresylic acid 100 hydrocarbon solvent, xylene, and sometimes n-methyl pyrrolidone and very small amounts of other contaminants. No indication of how or where the wastes were eventually disposed was given.

NRC operation became a Service Corporation of America (SCA) operation in 1973. In 1974 SCA had a permit application for disposal of municipal refuse withheld because of problems with closing of the site after high water was experienced in 1973.

A copper wire salvage operation was also planned during this period. The records do not indicate whether this plan was ever carried out.

4. 1976-1981 (The Inactive Period)

During this period the site was inactive.

5. 1981-1985 (The Discovery and Listing Period)

The site was proposed for addition to the National Priorities List (NPL) in October of 1984 and was finalized on the NPL in June of 1986. The site was listed by U.S. EPA using the Hazard Ranking System (HRS). HRS records state that the landfill had accepted volatile industrial liquids, 2,4-dimethyl phenol, methylene chloride, arsenic, and sludges and that the entire site's waste quantity was equivalent to 2,820 50-gallon barrels.

Also in 1984, Waste Management Inc. (WMI) acquired SCA. WMI conducted an initial investigation of the site that year. In early 1985, WMI completed its hydrologic assessment of the site and had a closure plan prepared. At that time EPA and WMI entered into discussions as to the needs and responsibilities of further investigations at the site.

6. 1986-Present (RI/FS Period)

In February of 1986, U.S. EPA released its findings on residential well samples from the River Haven community. There was no evidence of contamination in the samples nor was there evidence of contamination derived from the Fort Wayne Reduction site. Subsequently, U.S. EPA initiated the Remedial Investigation (RI) of the site to define the nature and extent of contamination present and characterize the potential threats to public health and/or the environment from the site. RI field activities were performed in two phases and were completed in May 1987. The results are described in the RI report, dated January 7, 1988.

The Public Comment Feasibility Study (FS) was completed May 2, 1988. The FS documents, in detail, the development and evaluation of an array of remedial action alternatives for the Fort Wayne Reduction site. Public comment on the FS ended June 7, 1988.

B. Enforcement Activities

U.S. EPA has identified approximately fourteen Potentially Responsible Parties (PRPs) for the Fort Wayne Reduction site. U.S. EPA identified the PRPs on the basis of site records (i.e., customer listings) and responses to information requests submitted pursuant to Section 104(e) of CERCLA.

Four of these PRPs were identified by a general Notice Letter dated January 6, 1988. On February 2, 1988. U.S. EPA held a meeting with the four PRPs to discuss the RI and future enforcement activities. The remaining ten PRPs were subsequently identified in a general Notice Letter dated April 28, 1988.

On May 5, 1988, Special Notice Letters were sent to the fourteen PRPs pursuant to Section 122(e) of the Superfund Amendments and Reauthorization Act (SARA) of 1986. On May 24, 1988, representatives from U.S. EPA, IDEM and IAG met with the PRPs to discuss the Feasibility Study/Proposed Plan and enforcement activities for the site. The deadline for receipt of a "good faith offer" to conduct the remedial design and remedial action discussed in this Record of Decision Summary was July 11, 1988. A "good faith offer" to conduct the remedial design and remedial action was received from one of the PRPs. Therefore, the deadline for negotiations was extended to September 9, 1988.

III. COMMUNITY RELATIONS HISTORY

During the RI/FS, U.S. EPA and IDEM met several times with, and supplied fact sheets to, the community. In addition, two information repositories were established to provide both general and project-specific information and reports to the community.

In accordance with CERCLA Section 117, the U.S. EPA published a Proposed Plan for the site. This document was made available at the start of the public comment period. A public meeting was held on May 11, 1988 to discuss the Public Comment Feasibility Study and U.S. EPA's Proposed Plan. Comments received at the May 11, 1988 meeting and during the public comment period (May 4, 1988 to June 7, 1988) are addressed in the Responsiveness Summary (Appendix A).

IV. SITE CHARACTERISTICS

Initial investigations (Phase I) of the site were designed to avoid violation of the existing soil cover and to determine by nondestructive methods and perimeter monitoring where source areas might be located and if any contaminant release might be detectable.

Results of these investigations indicated the site consisted of two characteristically different areas: the eastern half of the site consisting of a municipal/general refuse type landfill (approximately 15 acres) and the western half of the site (approximately 5 acres) characterized by diverse disposal activities involving industrial wastes as well as residual ash from earlier incinerator operations. Due to the difference in the composition of the two areas, further investigation (Phase II) of primarily the western portion of the site was conducted to delineate discrete source areas. In addition, further characterization of the site was continued through use of the previously established monitoring network.

The nature and extent of contamination defined for each of the media sampled during the RI is summarized in the following discussion. Any specific characteristics associated with a medium are also summarized in the following discussion.

A. Surficial Soils

The site can be divided into five distinctly different surficial material classifications. (Figure 3)

1. **Natural Materials.** Consisting of flood plain deposits, stream channel deposits, and generally undisturbed areas around the perimeter of the site.

2. **Municipal Landfill Cover.** Consisting of imported clay, silts and gravels averaging approximately 2 feet in thickness.

3. **Mixed Loamy Soil and Rubble.** Consisting of a mixture of loamy soils with some waste and rubble averaging approximately 3 feet in thickness.

4. **Mixed Granular Soil and Rubble and Clay Fill.** Consisting of gravelly soil, rubble, and construction debris densely compacted to an average of approximately 3 feet thick.

5. **Exposed Wire Waste and Mixed Soil.** Consisting of wire waste and soil with no cover materials present.

The ranges of contaminant concentrations found within the surficial soils is presented in Figure 4. The organic compounds were intermittently present at the specific on-site sampling locations. Organic contaminants were detected primarily on the western portion of the site, reflecting the mixed and random nature of disposal within this area. The municipal landfill cover on the eastern portion of the site does not present a source of organic contaminants.

The inorganic compounds detected in the surficial soils were arsenic, antimony, cadmium, copper, and lead. Cadmium is associated only with the wire disposal area. Arsenic is most prevalent in the municipal landfill cover material and was probably in the material applied as a cover. Background concentrations of lead and antimony were greater than those found on-site.

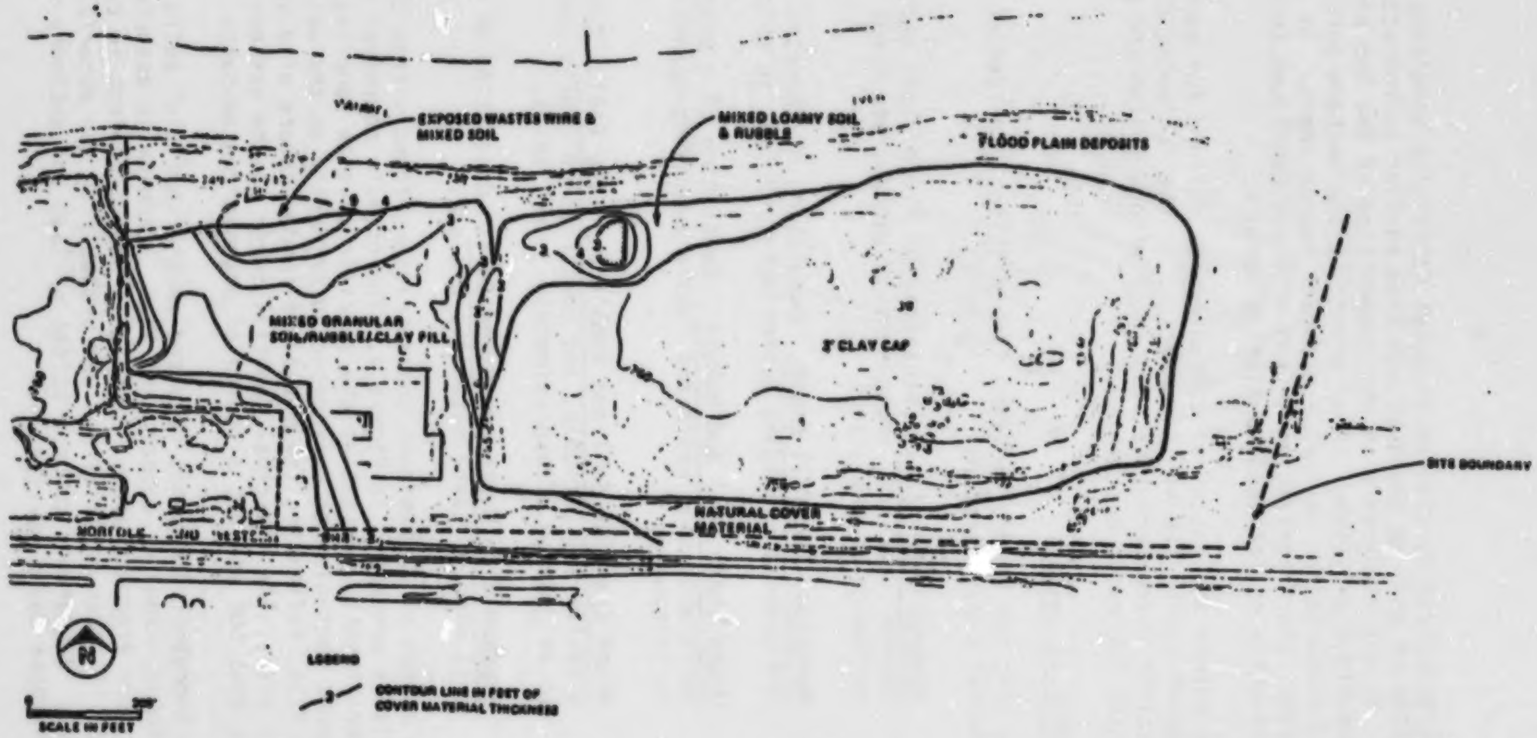

EXPOSED WASTES WIRE & MIXED SOIL
MIXED LOAMY SOIL & RUBBLE
FLOOD PLAIN DEPOSITS
MIXED GRANULAR SOIL/RUBBLE/CLAY FILL
2' CLAY CAP
NATURAL COVER MATERIAL
SITE BOUNDARY
NORFOLK AND WESTERN
N
LEGEND
CONTOUR LINE IN FEET OF COVER MATERIAL THICKNESS
0
200'
SCALE IN FEET

FIGURE 3
COVER MATERIAL COMPOSITION
AND THICKNESS
FT. WAYNE REDUCTION

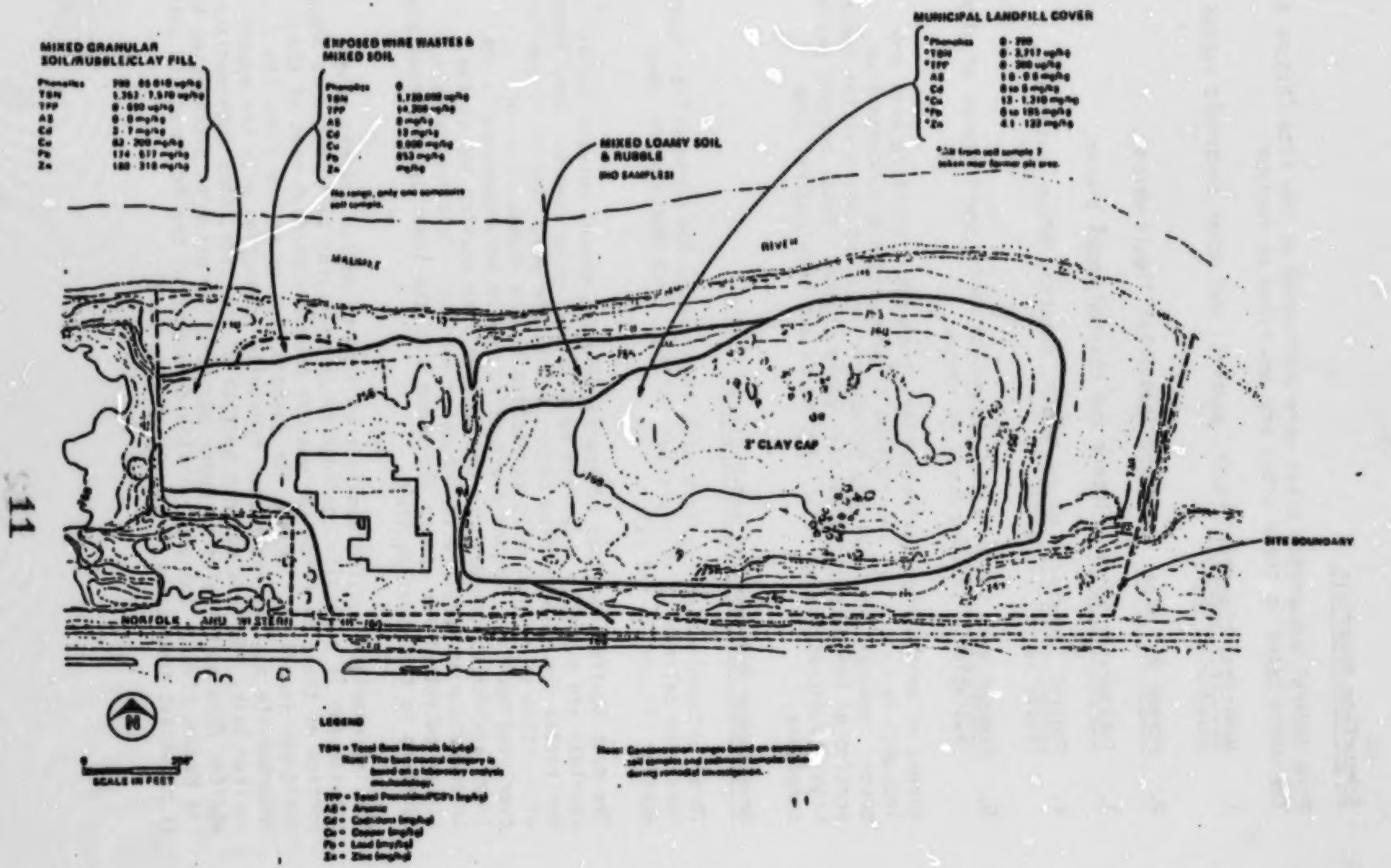

MIXED GRANULAR SOIL/RUBBLE/CLAY FILL
Phenolics 780 - 65,010 ug/kg
TBN 1,353 - 7,570 ug/kg
TPP 0 - 650 ug/kg
AS 0 - 8 mg/kg
Cd 2 - 7 mg/kg
Cu 62 - 200 mg/kg
Pb 114 - 577 mg/kg
Zn 180 - 318 mg/kg
EXPOSED WIRE WASTES & MIXED SOIL
Phenolics 0
TBN 1,130,000 ug/kg
TPP 64,200 ug/kg
AS 8 mg/kg
Cd 12 mg/kg
Cu 8,000 mg/kg
Pb 653 mg/kg
Zn mg/kg
No range, only one composite soil sample.
MIXED LOAMY SOIL & RUBBLE
(NO SAMPLES)
MUNICIPAL LANDFILL COVER
*Phenolics 0 - 290
*TBN 0 - 3,717 ug/kg
*TPP 0 - 300 ug/kg
AS 1.6 - 9.6 mg/kg
Cd 0 to 5 mg/kg
*Cu 13 - 1,310 mg/kg
*Pb 0 to 195 mg/kg
*Zn 4.1 - 122 mg/kg
*All from soil sample 7 taken near former pit area.
MAUMEE
RIVER
2' CLAY CAP
SITE BOUNDARY
NORFOLK AND WESTERN
N
0
200'
SCALE IN FEET
LEGEND
TBN = Total Base Neutrals (ug/kg)
Note: The base neutral category is based on a laboratory analysis methodology.
TPP = Total Pesticides/PCB's (ug/kg)
AS = Arsenic
Cd = Cadmium (mg/kg)
Cu = Copper (mg/kg)
Pb = Lead (mg/kg)
Zn = Zinc (mg/kg)
Note: Concentration ranges based on composite soil samples and sediment samples taken during remedial investigation.

FIGURE 4
CONCENTRATION RANGES FOR EACH SURFICIAL ZONE
FT. WAYNE REDUCTION FS

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B. Subsurface Materials

Five general subsurface areas were delineated at the site (Figure 5). The waste types in these areas are described as follows:

1. **Municipal Landfill** Paper, plastic, and other household wastes mixed with soil.
2. **Former Pit Area** Drums and industrial liquid wastes.
3. **Incinerator Waste** Cinders and charred metal pieces.
4. **General Industrial Waste** Paper, plastic, rubber materials, liquid wastes and drums.
5. **Exposed Wire Waste** Loose, loamy soil with small pieces of wire insulation. Crushed drums at depth.

Ranges of contaminant concentrations for each subsurface area are included in Figure 6. Two regions of high organic contamination occur: one centered over the former pit area and one over the central portion of the general industrial waste region. These regions exhibit high concentrations of volatiles, acids and base/neutral type compounds.

C. Groundwater Hydrogeology and Quality

Three unconsolidated aquifers with intervening low permeability layers have been delineated at the site: a deep, intermediate and upper aquifer (Figure 7A and 7B).

The deep aquifer consists of coarse sand and gravel outwash and is overlain and possibly underlain by till confining layers. Very little horizontal groundwater flow occurs within the unit, and it is confined with little or no hydraulic connection to the Maumee River or overlying aquifer. Higher piezometric levels were measured in the lower aquifer as compared to the intermediate aquifer and in the intermediate as compared to the upper aquifer. This indicates a strong potential for upward flow from both the lower and intermediate aquifers to the upper aquifer.

The intermediate aquifer consists of fine to medium grained sandy outwash and is partially confined by an overlying till unit on a major portion of the site (from the western boundary through most of the municipal landfill). On the far eastern portion of the site, the intermediate aquifer has direct hydraulic connection with the upper aquifer unit. On this eastern portion of the site, some intermediate aquifer flow contributes to upper aquifer flow prior to discharging to the Maumee River. The general flow direction of the intermediate unit is northeast toward the Maumee River (Figure 8).

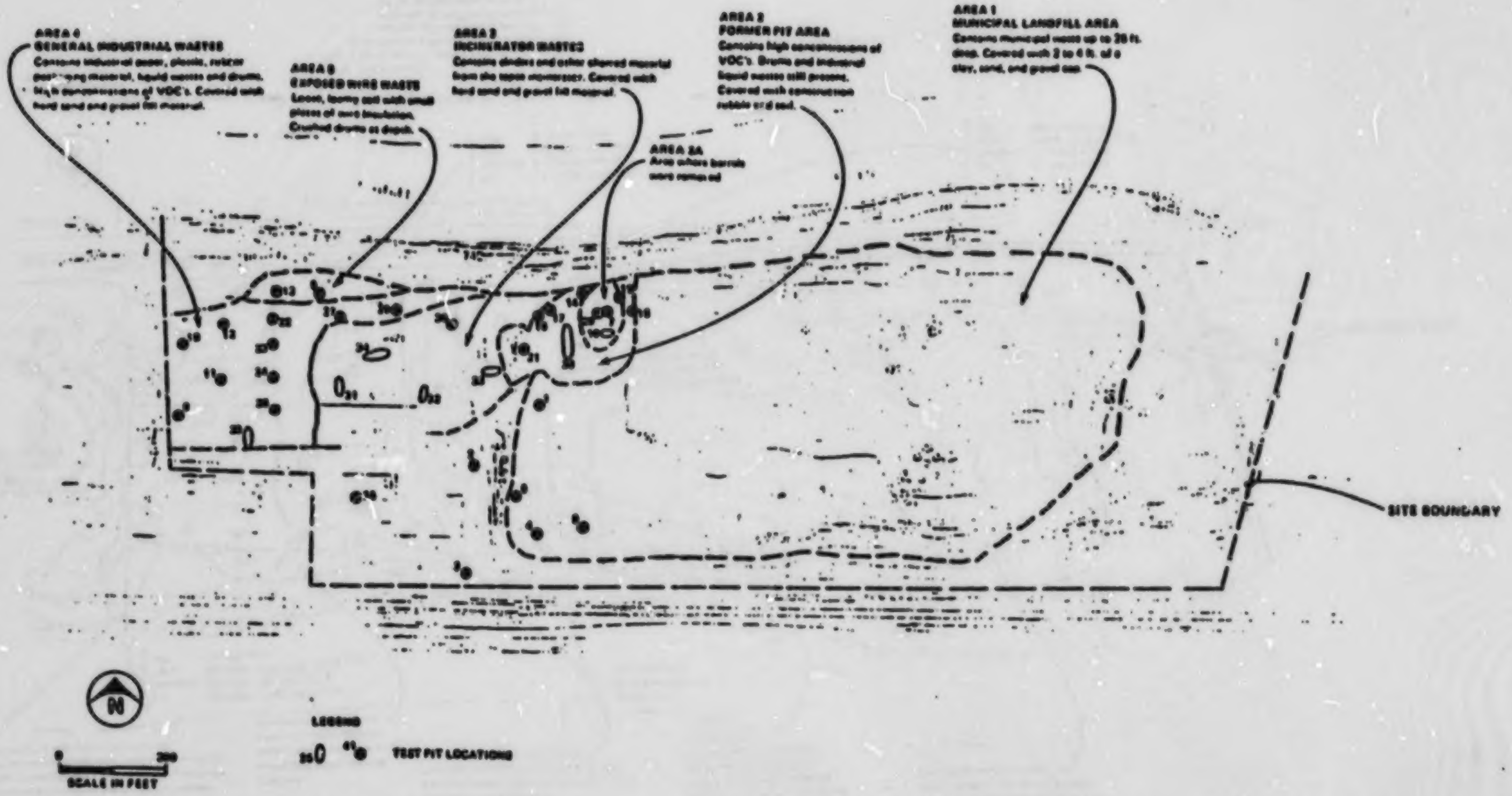
AREA 4
GENERAL INDUSTRIAL WASTES
Contains industrial paper, plastic, rubber packaging material, liquid wastes and drums. High concentrations of VOC's. Covered with hard sand and gravel fill material.
AREA 5
EXPOSED WIRE WASTE
Loose, loamy soil with small pieces of wire insulation. Crushed drums at depth.
AREA 3
INCINERATOR WASTES
Contains cinders and other charred material from the waste incinerator. Covered with hard sand and gravel fill material.
AREA 2A
Area where barrels were removed
AREA 2
FORMER PIT AREA
Contains high concentrations of VOC's. Drums and industrial liquid wastes still present. Covered with construction rubble and sod.
AREA 1
MUNICIPAL LANDFILL AREA
Contains municipal waste up to 20 ft. deep. Covered with 2 to 4 ft. of a clay, sand, and gravel cap.
SITE BOUNDARY
N
0
200
SCALE IN FEET
LEGEND
TEST PIT LOCATIONS

FIGURE 5
TEST PIT LOCATIONS
AND AREAS WITH SIMILAR
WASTE TYPES
FT. WAYNE REDUCTION RI

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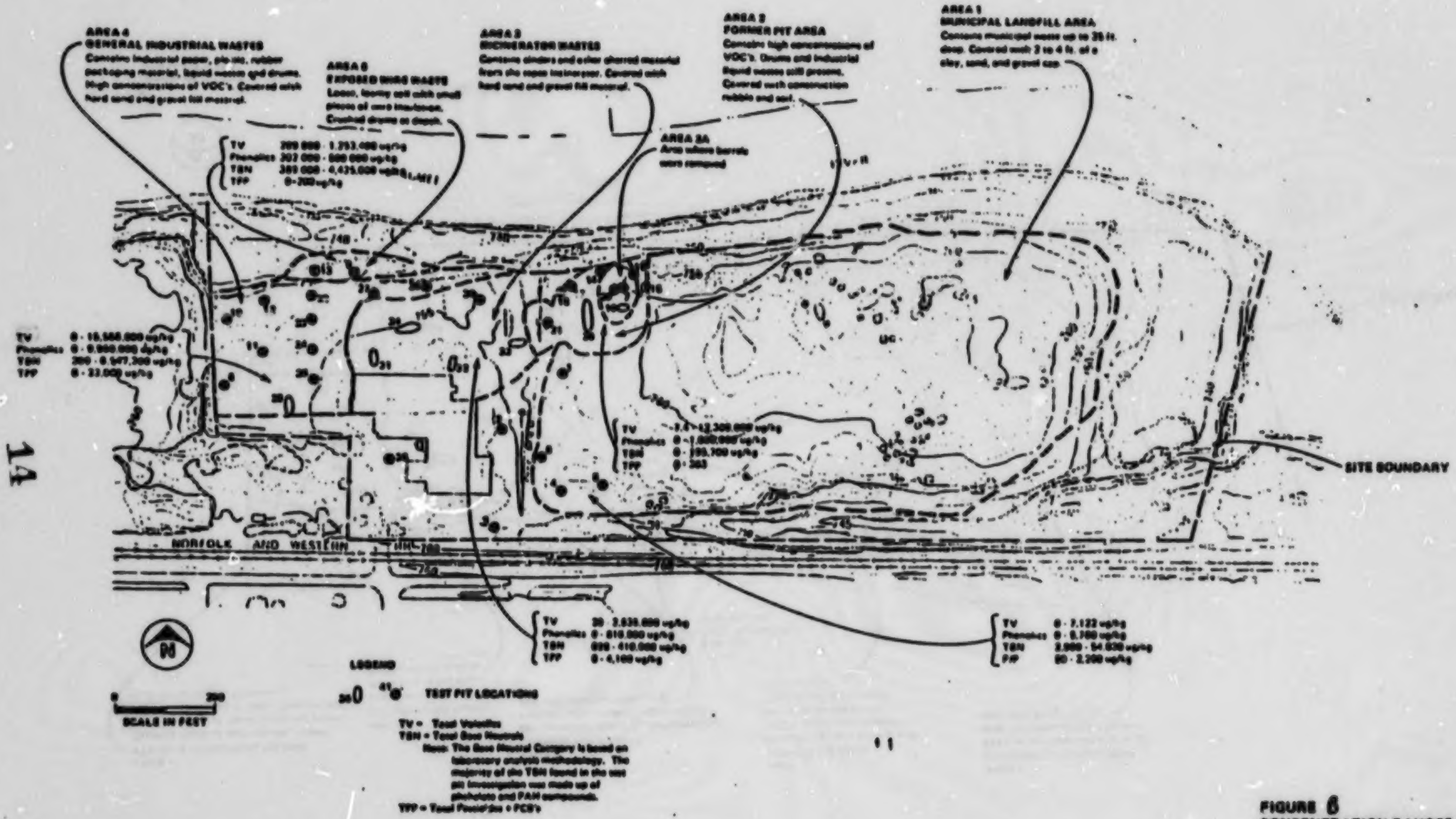
best available copy.


AREA 4
GENERAL INDUSTRIAL WASTES
Contains industrial paper, plastic, rubber packaging material, liquid wastes and drums. High concentrations of VOC's. Covered with hard sand and gravel fill material.
AREA 5
EXPOSED WIRE WASTE
Loose, loamy soil with small pieces of wire insulation. Crushed drums at depth.
AREA 3
INCINERATOR WASTES
Contains cinders and other charred material from the open incinerator. Covered with hard sand and gravel fill material.
AREA 2
FORMER PIT AREA
Contains high concentrations of VOC's. Drums and industrial liquid wastes still present. Covered with construction rubble and soil.
AREA 1
MUNICIPAL LANDFILL AREA
Contains municipal waste up to 25 ft. deep. Covered with 2 to 4 ft. of a clay, sand, and gravel cap.
AREA 2A
Area where barrels were removed
TV 209,000 - 1,253,000 ug/kg
Phenolics 207,000 - 500,000 ug/kg
TBN 289,000 - 4,425,000 ug/kg
TPP 0 - 200 ug/kg
TV 0 - 15,568,000 ug/kg
Phenolics 0 - 9,900,000 ug/kg
TBN 200 - 6,547,300 ug/kg
TPP 0 - 33,000 ug/kg
TV 3.4 - 12,300,000 ug/kg
Phenolics 0 - 1,000,000 ug/kg
TBN 0 - 185,700 ug/kg
TPP 0 - 263
TV 20 - 2,835,000 ug/kg
Phenolics 0 - 810,000 ug/kg
TBN 820 - 410,000 ug/kg
TPP 0 - 4,100 ug/kg
TV 0 - 7,122 ug/kg
Phenolics 0 - 5,700 ug/kg
TBN 2,000 - 54,000 ug/kg
P/P 80 - 2,200 ug/kg
SITE BOUNDARY
NORFOLK AND WESTERN
N
0 200
SCALE IN FEET

LEGEND

30 0 41 ● TEST PIT LOCATIONS

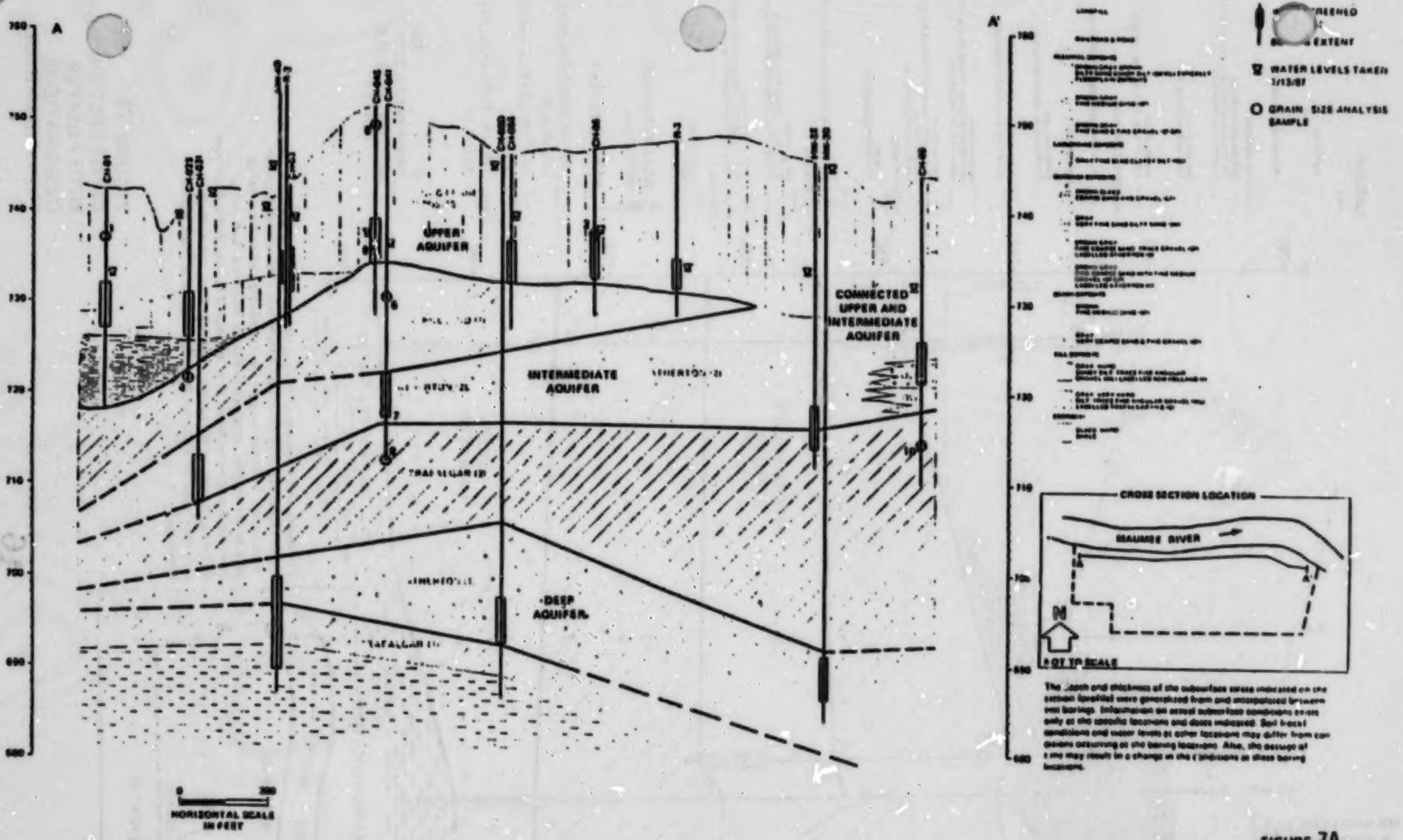
TV = Total Volatiles

TBN = Total Base Neutrals

Note: The Base Neutral Category is based on laboratory analysis methodology. The majority of the TBN found in the test pit investigation was made up of phenolics and PAH compounds.

TPP = Total Pesticides + PCB's

FIGURE 6
CONCENTRATION RANGES (ug/kg)
FOR EACH WASTE TYPE AT
SUBSURFACE ZONES
FT. WAYNE REDUCTION FS


A
A'
750
740
730
720
710
700
690
680
UPPER AQUIFER
INTERMEDIATE AQUIFER
CONNECTED UPPER AND INTERMEDIATE AQUIFER
DEEP AQUIFER
0
200
HORIZONTAL SCALE IN FEET
CROSS SECTION LOCATION
MAUMEE RIVER
A
A'
N
NOT TO SCALE
SCREENED
EXTENT
WATER LEVELS TAKEN 3/13/87
GRAIN SIZE ANALYSIS SAMPLE

The depth and thickness of the subsurface strata indicated on the section (profile) were generalized from and interpolated between test borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

FIGURE 7A
CROSS SECTION A-A' WITH AQUIFER DESIGNATIONS
FT. WAYNE REDUCTION

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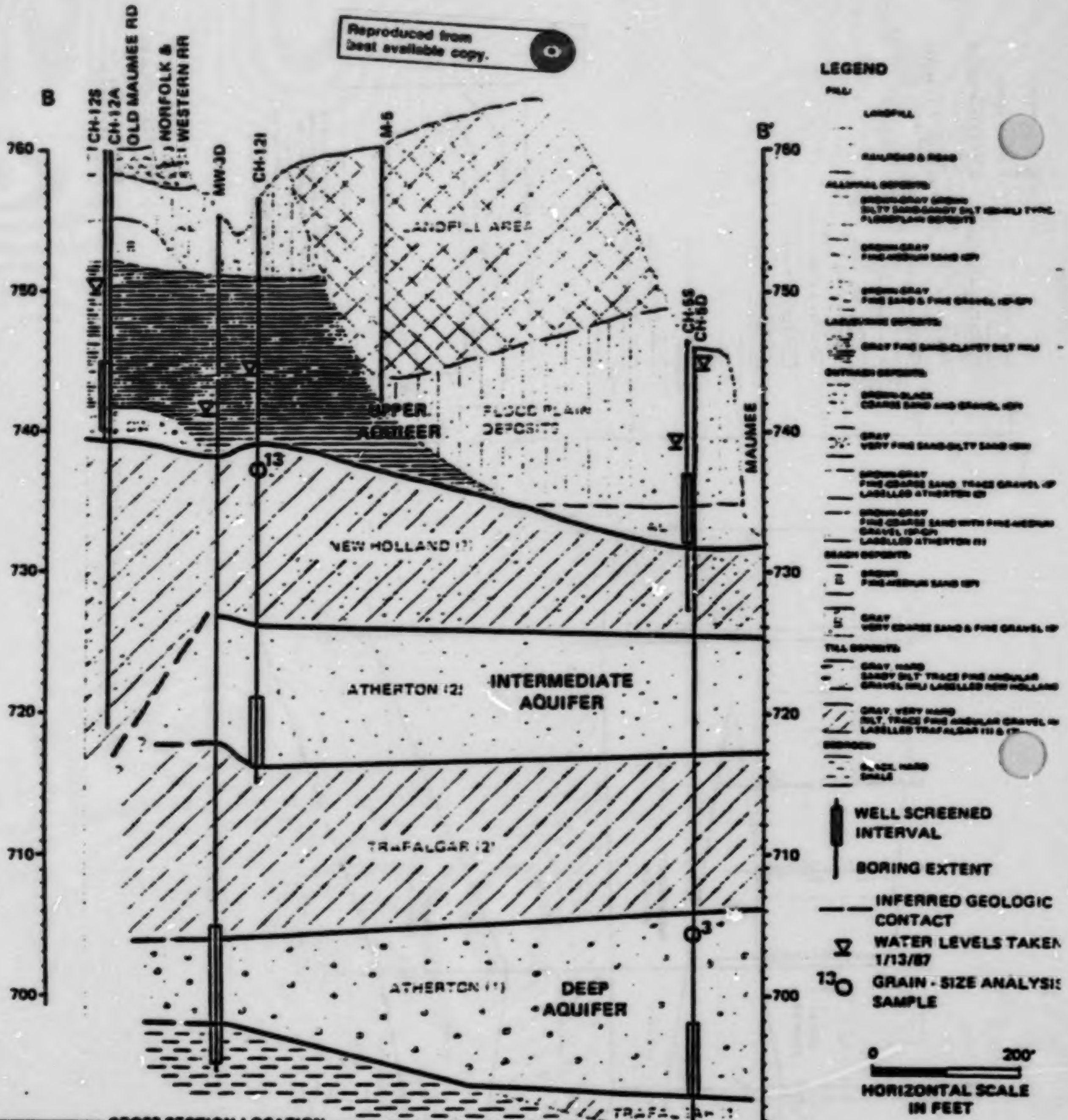
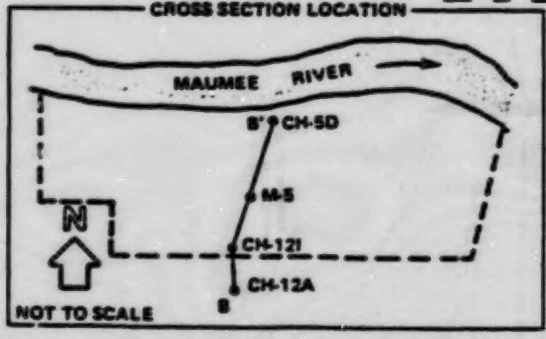

B
CH-12S
CH-12A
OLD MAUMEE RD
NORFOLK & WESTERN RR
MW-3D
CH-12I
M-5
B'
CH-5S
CH-5D
MAUMEE
760
750
740
730
720
710
700
690
LANDFILL AREA
UPPER AQUIFER
FLOOD PLAIN DEPOSITS
AL
13
NEW HOLLAND (1)
ATHERTON (2)
INTERMEDIATE AQUIFER
?
TRAFALGAR (2)
3
ATHERTON (1)
DEEP AQUIFER
TRAFALGAR (1)
LEGEND
FILL:
LANDFILL
RAILROAD & ROAD
ALLUVIAL DEPOSITS:
BROWN-GRAY (GREEN) SILTY SAND-SANDY SILT (SM-ML) TYPICAL FLOODPLAIN DEPOSITS
BROWN-GRAY FINE-MEDIUM SAND (SP)
BROWN-GRAY FINE SAND & FINE GRAVEL (SP-GP)
LACUSTRINE DEPOSITS:
GRAY FINE SAND-CLAYEY SILT (ML)
OUTWASH DEPOSITS:
BROWN-BLACK COARSE SAND AND GRAVEL (GP)
GRAY VERY FINE SAND-SILTY SAND (SM)
BROWN-GRAY FINE-COARSE SAND, TRACE GRAVEL (SP) LABELLED ATHERTON (2)
BROWN-GRAY FINE-COARSE SAND WITH FINE-MEDIUM GRAVEL (SP-GP) LABELLED ATHERTON (1)
BEACH DEPOSITS:
BROWN FINE-MEDIUM SAND (SP)
GRAY VERY COARSE SAND & FINE GRAVEL (SP
TILL DEPOSITS:
GRAY, HARD SANDY SILT, TRACE FINE ANGULAR GRAVEL (ML) LABELLED NEW HOLLAND
GRAY, VERY HARD SILT, TRACE FINE ANGULAR GRAVEL (ML) LABELLED TRAFALGAR (1) & (2)
BEDROCK:
BLACK, HARD SHALE
WELL SCREENED INTERVAL
BORING EXTENT
INFERRED GEOLOGIC CONTACT
WATER LEVELS TAKEN 1/13/87
13 GRAIN - SIZE ANALYSIS SAMPLE
0
200'
HORIZONTAL SCALE IN FEET


CROSS SECTION LOCATION
MAUMEE RIVER
B'
CH-5D
M-5
CH-12I
CH-12A
B
N
NOT TO SCALE

The depth and thickness of the subsurface strata indicated on the section (profile) were generalized from and interpolated between test borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil (rock) conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

FIGURE 7B
CROSS SECTION B-B'
WITH AQUIFER
DESIGNATIONS
FT. WAYNE REDUCTION

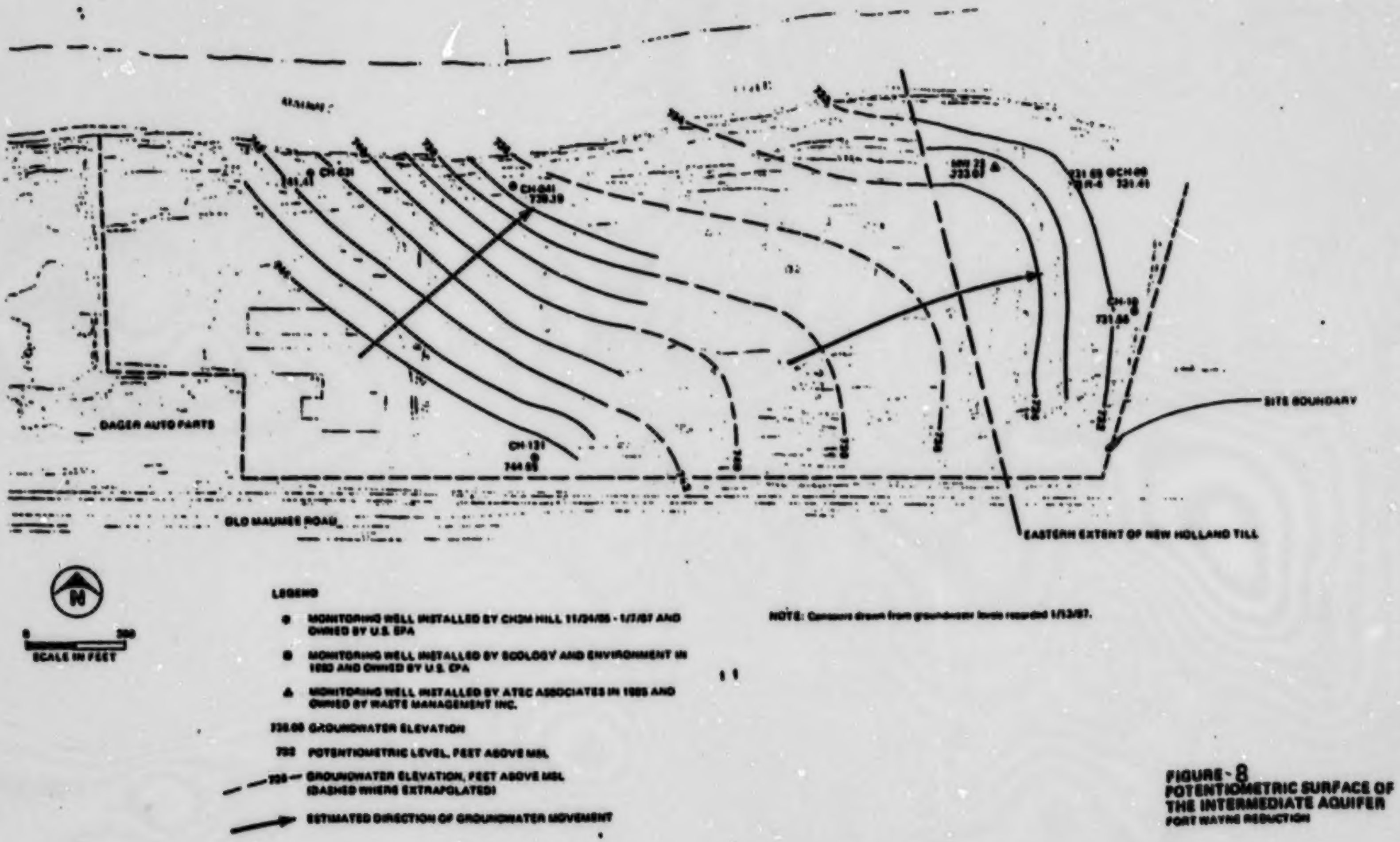

CH-021
741.41
CH-041
738.39
CH-131
744.85
MW 22
733.07
731.85 CH-09
R-4 731.41
CH-19
731.86
DAGER AUTO PARTS
OLD MAUMEE ROAD
SITE BOUNDARY
EASTERN EXTENT OF NEW HOLLAND TILL
N
0
300
SCALE IN FEET
LEGEND
MONITORING WELL INSTALLED BY CH2M HILL 11/24/86 - 1/7/87 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ECOLOGY AND ENVIRONMENT IN 1980 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ATEC ASSOCIATES IN 1985 AND OWNED BY WASTE MANAGEMENT INC.
GROUNDWATER ELEVATION
POTENTIOMETRIC LEVEL, FEET ABOVE MSL
GROUNDWATER ELEVATION, FEET ABOVE MSL (DASHED WHERE EXTRAPOLATED)
ESTIMATED DIRECTION OF GROUNDWATER MOVEMENT
NOTE: Contours drawn from groundwater levels recorded 1/13/87.

FIGURE - 8
POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER
FORT WAYNE REDUCTION

The upper or surficial aquifer consists of alluvial and lacustrine deposits and is underlain by a till unit from the western boundary through most of the municipal landfill. Groundwater flow is generally north and northeast toward the Maumee River and Herber Drain with all groundwater flow discharging to the Maumee River (Figure 9). Groundwater seeps were observed during the RI along the river bank in the western portion of the site. These seeps were exposed or covered depending on the river stage, and are representative of the groundwater table.

The total groundwater discharge from the site (through the upper aquifer) to the river is estimated at 2 to 5 gallons per minute. The horizontal hydraulic conductivity of the surficial aquifer ranges from 4.5×10^{-5} cm/sec to 6.3×10^{-3} cm/sec.

The contaminant distribution in the aquifer system at the site is limited to the upper aquifer. Samples taken from the intermediate and lower aquifers did not indicate the presence of contamination. Total organic contaminant concentrations for groundwater in the surficial aquifer and groundwater seeps are given in Figure 10. The major constituents of the total organic contaminant concentrations are 2,4-dimethyl phenol, chlorobenzene, benzene, methylene chloride, and xylenes.

Samples drawn from Well CH-04S contained a product-like material. This material was similar to that found in test pit samples from the former pit area, directly upgradient from the well. The similarities in composition of contaminants between the former pit area and Well CH-04S indicate a direct release from the former pit area has occurred.

D. Surface Water Quality

An investigation of Herber Drain was conducted to evaluate the potential for direct surface water contamination from the site. Sample locations were selected to provide comparative off-site (background) samples, and as much areal coverage as practicable. Locations were identified on visual observations and proximity to fill areas. The marshy area in the middle of the site was also sampled as this location would be representative of runoff from the landfill (Figure 11).

The background sample collected in Herber Drain and the sample from the marshy area contained insignificant amounts of organic contaminants. Only trace amounts of volatile and acid compounds were detected in the samples collected from Herber Drain adjacent to the site. The inorganic analyses showed no significant increase over background concentrations for the samples collected in Herber Drain and the marshy area.

A discussion on Maumee River quality is presented in the section "Summary of Site Risks".

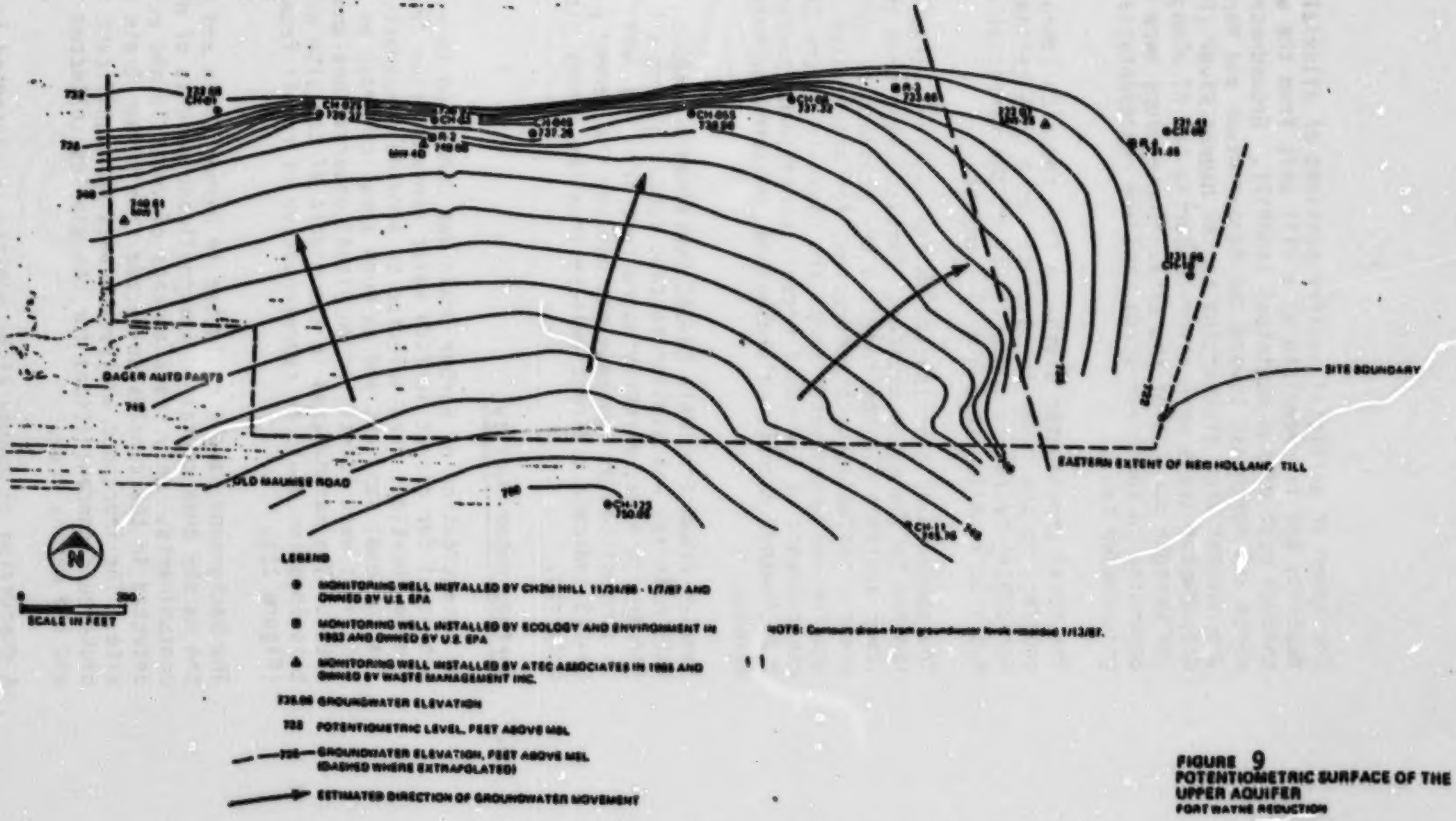

SITE BOUNDARY
EASTERN EXTENT OF NEW HOLLAND TILL
OLD MAUMEE ROAD
DAGER AUTO PARTS
732
736
740
CH 071
CH 055
CH 065
CH 066
CH 11
CH 172
MW 4D
R 2
R 3
737.26
720.37
740.08
730.05
LEGEND
MONITORING WELL INSTALLED BY CH2M HILL 11/24/86 - 1/7/87 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ECOLOGY AND ENVIRONMENT IN 1983 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ATEC ASSOCIATES IN 1985 AND OWNED BY WASTE MANAGEMENT INC.
735.05 GROUNDWATER ELEVATION
732 POTENTIOMETRIC LEVEL, FEET ABOVE MSL
GROUNDWATER ELEVATION, FEET ABOVE MSL (DASHED WHERE EXTRAPOLATED)
ESTIMATED DIRECTION OF GROUNDWATER MOVEMENT
NOTE: Contours drawn from groundwater levels recorded 1/13/87.
0
200
SCALE IN FEET
N

FIGURE 9
POTENTIOMETRIC SURFACE OF THE UPPER AQUIFER
FORT WAYNE REDUCTION

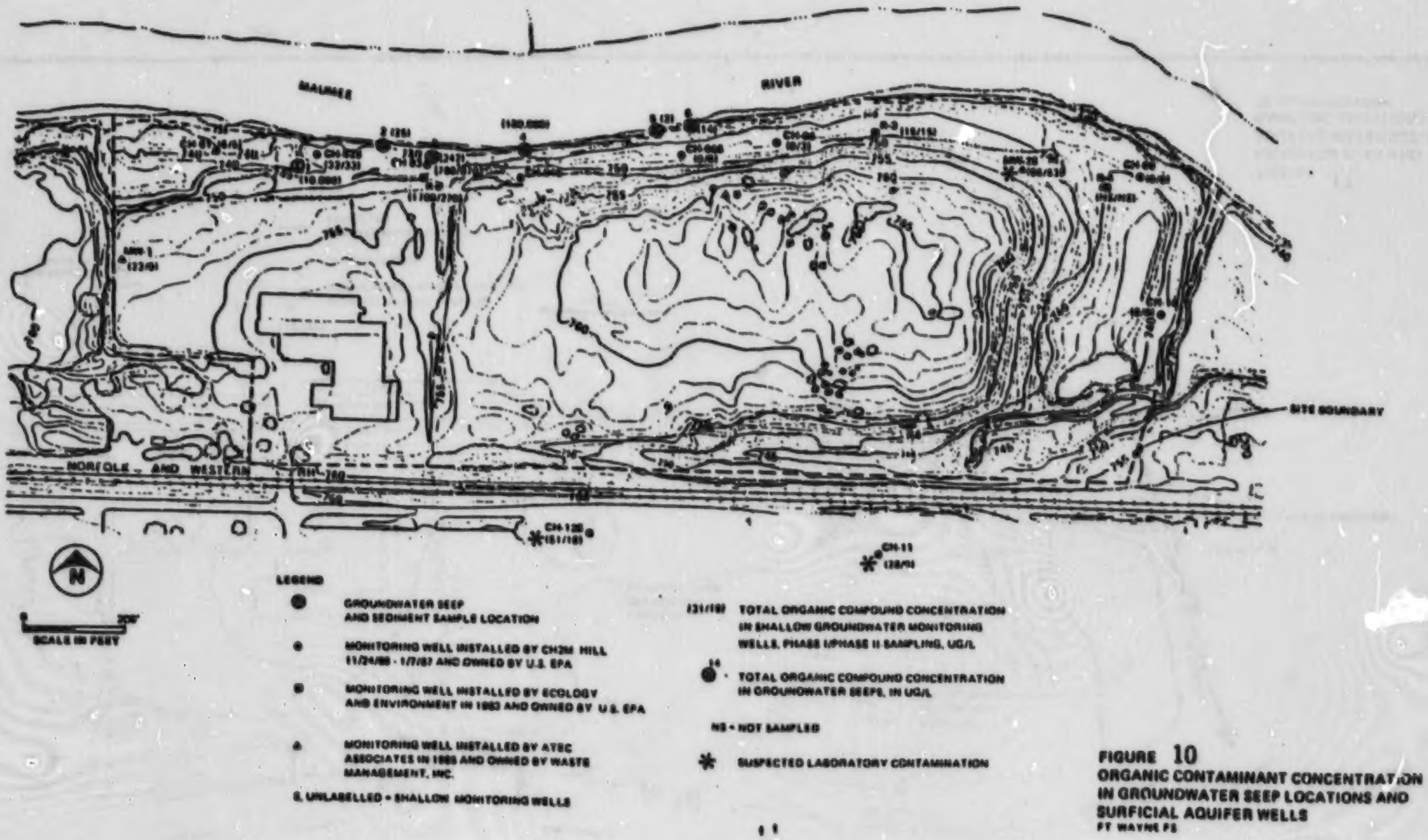

MAUMEE
RIVER
SITE BOUNDARY
NORFOLK AND WESTERN RR
CH-12S (51/18)
CH-11 (28/11)
N
0
200'
SCALE IN FEET
LEGEND
GROUNDWATER SEEP AND SEDIMENT SAMPLE LOCATION
MONITORING WELL INSTALLED BY CH2M HILL 11/24/86 - 1/7/87 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ECOLOGY AND ENVIRONMENT IN 1983 AND OWNED BY U.S. EPA
MONITORING WELL INSTALLED BY ATEC ASSOCIATES IN 1985 AND OWNED BY WASTE MANAGEMENT, INC.
S, UNLABELLED = SHALLOW MONITORING WELLS
(31/18) TOTAL ORGANIC COMPOUND CONCENTRATION IN SHALLOW GROUNDWATER MONITORING WELLS, PHASE I/PHASE II SAMPLING, UG/L
14 · TOTAL ORGANIC COMPOUND CONCENTRATION IN GROUNDWATER SEEPS, IN UG/L
NS = NOT SAMPLED
SUSPECTED LABORATORY CONTAMINATION

FIGURE 10
ORGANIC CONTAMINANT CONCENTRATION IN GROUNDWATER SEEP LOCATIONS AND SURFICIAL AQUIFER WELLS
FT WAYNE FS

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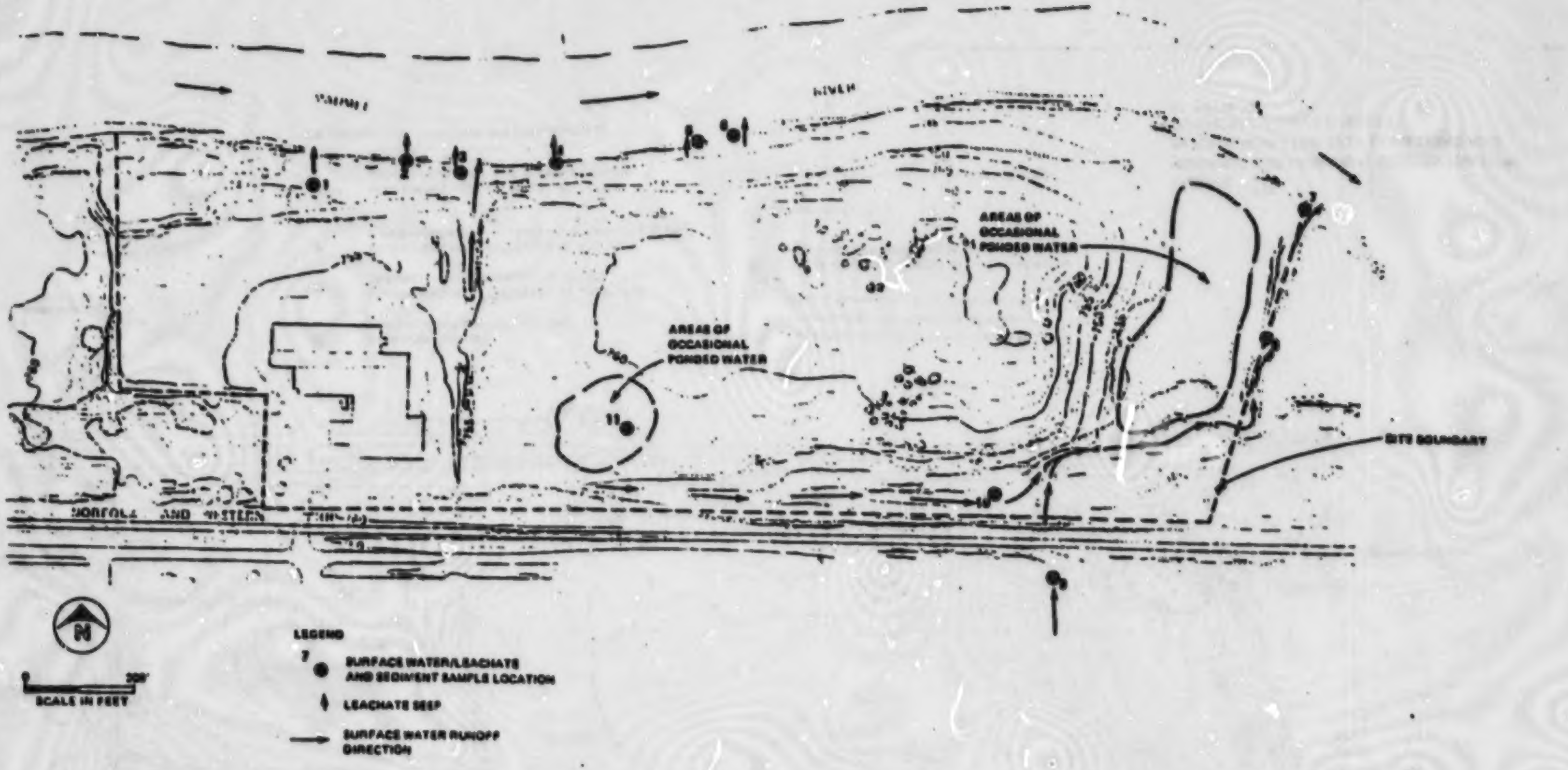
RIVER
AREAS OF
OCCASIONAL
PONDED WATER
AREAS OF
OCCASIONAL
PONDED WATER
SITE BOUNDARY
NORFOLK AND WESTERN
N
0
200'
SCALE IN FEET
LEGEND
7
SURFACE WATER/LEACHATE
AND SEDIMENT SAMPLE LOCATION
LEACHATE SEEP
SURFACE WATER RUNOFF
DIRECTION

FIGURE 11
DRAINAGE PLAN AND
SURFACE WATER/SEDIMENT
SAMPLING LOCATIONS
FT. WAYNE REDUCTION

E. Sediment Quality

An investigation of sediment quality near the site was included as a part of the RI. The primary purpose of the investigation was to collect data to allow a comparison of sediment quality adjacent to and downstream from the site in relation to sediment quality upstream from the site. Therefore, sediment samples were collected from zones of apparent deposition upstream, adjacent to and downstream of the site. Figure 12 shows the various sediment sampling locations. Maumee River locations were 12 to 15 feet from the river bank while groundwater seep locations were part of the river bank. Herber Drain locations were primarily mid-channel.

The sampling results indicated the presence of contaminants in the sediments (Tables 1, 2 and 3). The contaminants found at elevated levels (above background) in Herber Drain are not related to the site. The contaminants detected in Herber Drain were not detected in the surface soils or groundwater in the eastern portion of the site, the most probable on-site source area for Herber Drain. The contaminants present in Herber Drain are probably due to the backwash of Maumee River sediment during high river stages.

As previously stated, the site is located in an area of numerous point (i.e., wastewater treatment plant) and nonpoint sources (i.e., abandoned landfills). These additional sources made it very difficult to establish a clear relationship between the site and the contaminant levels in the Maumee River sediments, especially when the contaminant levels in the Maumee River and groundwater seep sediments adjacent to the site were not substantially different than the contaminant levels in the Maumee River sediments upstream from the site (Table 4).

A detailed discussion of Maumee River and groundwater seep sediments and the issues associated with addressing contamination in the Maumee River and groundwater seep sediments near the site was presented in Appendix G of the FS. The specific issues discussed in Appendix G are:

- Background conditions
- Cause and effect
- Action levels
- Benefits achieved by site remediation

Based on the information presented in Appendix G of the FS, addressing the Maumee River and groundwater seep sediments adjacent to the site was not established as a remedial action goal for the site.

V. SUMMARY OF SITE RISKS

A baseline risk assessment was performed for the Fort Wayne Reduction site as part of the RI Appendix B of the RI report). The risk assessment identified and evaluated potential human health and

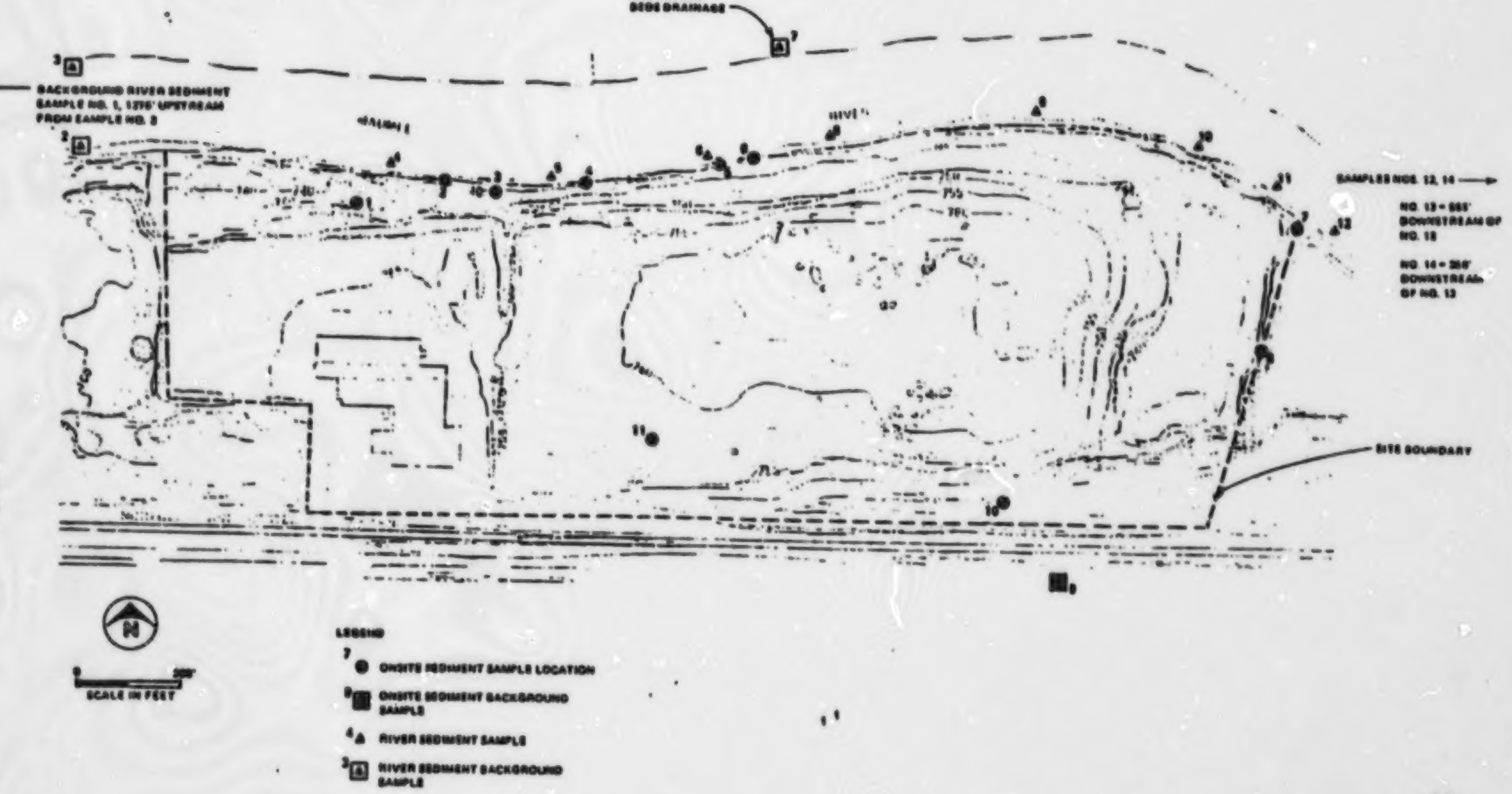
WPC SLUDGE
BEDS DRAINAGE
BACKGROUND RIVER SEDIMENT
SAMPLE NO. 1, 1275' UPSTREAM
FROM SAMPLE NO. 2
SAMPLES NOS. 13, 14
NO. 13 = 555'
DOWNSTREAM OF
NO. 12
NO. 14 = 250'
DOWNSTREAM
OF NO. 13
SITE BOUNDARY
N
0
200'
SCALE IN FEET
LEGEND
ONSITE SEDIMENT SAMPLE LOCATION
ONSITE SEDIMENT BACKGROUND SAMPLE
RIVER SEDIMENT SAMPLE
RIVER SEDIMENT BACKGROUND SAMPLE

FIGURE 12
ONSITE AND RIVER
SEDIMENT SAMPLING
LOCATIONS
FT. WAYNE REDUCTION

Table 1
Summary of Maume [illegible] er Sediment Data for Selected Chemicals

Chemical (ug/kg)	Upstream		Upstream		Upstream		Adjacent to seeps			Adjacent to seeps			POTW		Adjacent to seeps			Downstream from seeps				Downstream from seeps				Downstream from seeps		
	001-01	001-02	002-01	002-02	003-01	003-02	004-01	004-02	005-01	005-02	006-01	006-02	007-01	007-02	008-01	008-02	009-01	009-02	010-01	010-02	011-01	011-02	012-01	012-02	013-01	013-02	014-01	014-02
Benzene												1.4					3.7											
2-Butanone																4												1.7
Chloroform						7																			3.2			
Toluene						2.4											2.9								2.9			0.4
2,4-Dimethyl phenol																		9.0		2	41				1.3			2.7
4-Methyl phenol																												
Phenol																												
PAHs	35034	45234					4072	2230	2317	2220	609		1700	1610	5676	2210	909		2325	3017	3706	3382	2340	1010	6670	9620	1264	801
PCBs							360		220																			
(mg/kg)																												
Chromium	32	20	7	9	31	16	9	7	17	12	3	15	21	17	18	9	9	6.9	9	9	8	7	13	10	17	10	13	15
Copper	21	22	7	13	30	21	13	9	167	97	20	8	32	33	33	23	11	8	9	16	26	13	49	62	91	43	22	73
Lead	25	3710	8	3	19	13	20	47	32	26	47	137	27	60	71	23	17	3	66	31	92	39	19	30	42	27		8
Nickel	20	21	11	14	69	23	11	6	11	11	7	14	25	24	18	18	9	9	11	11	9	14	18	11	13	11	25	24

Table 2
Summary of Fort Wayne Reduction Groundwater Seep Samples

Chemical	GW Seep 1 ug/l	Seep Sediment 1 ug/kg	GW Seep 2 ug/l	Seep Sediment 2 ug/kg	GW Seep 3 ug/l	Seep Sediment 3 ug/kg	GW Seep 4 ug/l	Seep Sediment 4 ug/kg	GW Seep 5 ug/l	Seep Sediment 5 ug/kg	GW Seep 6 ug/l	Seep Sediment 6 ug/kg	GW Seep 7 ug/l	Seep Sediment 7 ug/kg
Acetone				29						16		13		
1,1,1-Trichloroethane							3100							
1,1-Dichloroethane							4000							
4-Methyl-2-Pentanone							3100							
Benzene	12	11	3		1	2			3	14	14	6		
Ethylbenzene	410	2000					4700	330000				8		
Methylene chloride							34000							
Tetrachloroethane							130							
Toluene		2400					10000	190000		16		200		
Xylene		9400					31000	1400000				6		
trans 1,2-Dichloroethene							7400							
Trichloroethene							2300							
Vinyl chloride							290							3
2,4-Dimethyl phenol	4300	20000			30		74000	120000						
2-Methyl phenol	230	930			17		970000	78000						
4-Methyl phenol	1000	2300			73		2E+06	120000						
Phenol		2300			56		2E+06	120000						
CD		960		600				2200						
Chromium	13	82000	30	30000	25	37000	32	27000	910	9000	11	10000	12	29000
Copper	109	369000	215	133000	32	74000	165	37000	2200	17000	44	25000	65	17000
Lead	69	182000	112	61000	11	152000	99	23000	720	11000	21	10000	11	12000
Nickel	30	62000	63	23000	30	78000	142	22000	1600	16000	37	11000		20000

able 3
ummary of Maumee River Sediment Data - Upstream
ish and Wildlife Service and Army Corp of Engineers

hemical (ug/kg)	FWS 9	FWS 10	ACOE 3	ACOE 4	ACOE 5	ACOE 6	ACOE 7	ACOE 8	FWS 11	FWS 12	ACOE 9	ACOE10	ACOE11	ACOE12	FWS 13	FWS 14
PCBs			1.47	0.03		0.13	<0.1	<0.2			0.30	0.13	3.3	0.07	0.09	0.06
Copper	33	90	12	13	23	13	32	22	46	31	32	22	310	19	63	40
Lead	52	66	36	<10	30	33	74	24	63	18	33	26	94	11	69	82

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COMPARISON OF SEDIMENT LEVELS

hemical (mg/kg)	All upstream sediment samples						All upstream samples except [illegible] 01					
	Mean	Std Deviation	Maximum Detected	Minimum Detected	Number of Samples	Number of Positives	Mean	Std Deviation	Maximum Detected	Minimum Detected	Number of Samples	Number of Positives
Bs	-	-	3300	30	22	9	-	-	3300	30	21	9
pper	40	31	260	7	22	22	40	32	260	7	21	21
ad	206	763	3710	3	22	22	39	27	94	3	21	21

emical (mg/kg)	River sediments adjacent to site						River sediments adjacent to site and bank seep sediments					
	Mean	Std Deviation	Maximum Detected	Minimum Detected	Number of Samples	Number of Positives	Mean	Std Deviation	Maximum Detected	Minimum Detected	Number of Samples	Number of Positives
Bs	-	-	360	220	10	2	-	-	2200	220	15	4
pper	40	30	167	8	10	10	47	49	167	8	15	15
ad	45	42	237	3	10	10	39	46	237	3	15	15

environmental threats from the site under the no action alternative. The no action alternative assumes that no remedial actions (including institutional controls) will occur.

The baseline risk assessment included the following:

- Identification of potential chemicals of concern
- Toxicity Assessment
- Exposure Assessment
- Risk Characterization

A. Potential Chemicals of Concern

Ninety-one chemicals were detected in samples collected during the RI. The distribution of the chemicals at the Fort Wayne Reduction site are summarized by media in Table 5. It was not feasible to include all of these chemicals in the risk assessment. Therefore, potential chemicals of concern were selected to represent the hazards the site may pose to human health and the environment.

Chemicals of concern were selected in the following manner. First, all chemicals with critical toxicity values were selected if they were detected in a media to which exposure could occur. Second, additional chemicals were selected if they were representative of the site (across media) or represented a significant contaminant source. Table 6 lists the forty-three chemicals selected as potential chemicals of concern for the Fort Wayne Reduction site.

B. Toxicity Assessment

The toxicity assessment for the Fort Wayne Reduction site summarized the toxicological characteristics of the selected potential chemicals of concern, the critical toxicity values (i.e., cancer potency factor or reference dose), and the risk estimation methodology.

C. Exposure Assessment

In the exposure assessment, the potential exposure pathways by which humans and wildlife could come into contact with contaminants from the site were evaluated. Exposure pathways were considered for both current and future land use conditions.

A complete exposure pathway has five elements:

- a contaminant source
- a mechanism for contaminant release
- an environmental transport medium
- an exposure point
- a route of exposure.

Table 5

CHEMICALS DETECTED, BY MEDIA
FORT WAYNE REDUCTION
Page 1 of 3

Chemical	Onsite Surface Soil	Leachate Seeps	Leachate Seeps Sediment	Test Pits	Monitoring Wells	Product	Onsite Water Sediment	Onsite Surface Water
VOLATILE ORGANIC COMPOUNDS								
Acetone	Not Analyzed		*	*			*	
Benzene	Not Analyzed	*		*	*		*	
2-Butanone	Not Analyzed			*				
Carbon disulfide	Not Analyzed			*				
Chlorobenzene	Not Analyzed	*	*	*	*			
Chloroethane	Not Analyzed	*						
Chloroform	Not Analyzed							*
1,1-Dichloroethane	Not Analyzed	*		*		*		
1,1-Dichloroethene	Not Analyzed	*						
trans-1,2-Dichloroethene	Not Analyzed	*		*				*
Ethylbenzene	Not Analyzed	*	*	*		*		
2-Hexanone	Not Analyzed			*				
Methylene chloride	Not Analyzed	*		*	*	*	*	
4-Methyl-2-pentanone	Not Analyzed	*		*				
Styrene	Not Analyzed			*				
Tetrachloroethene	Not Analyzed	*		*		*		
Toluene	Not Analyzed	*	*	*	*		*	
1,1,1-Trichloroethane	Not Analyzed	*		*		*		
Trichloroethene	Not Analyzed	*	*	*		*	*	
Vinyl chloride	Not Analyzed	*						
Xylenes	Not Analyzed	*	*	*	*	*		
ACID EXTRACTABLES								
Benzoic acid				*				
2,4-Dimethylphenol	*	*	*	*	*	*		
2-Methylphenol	*	*	*	*		*		*
4-Methylphenol	*	*	*	*		*		
2-Nitrophenol				*				*
4-Nitrophenol						*		
Pentachlorophenol				*		*		
Phenol	*	*	*	*		*		

Table 5

CHEMICALS DETECTED, BY MEDIA
FORT WAYNE REDUCTION
Page 2 of 3

Chemical	Onsite Surface Soil	Leachate Seeps	Leachate Seeps Sediment	Test Pits	Monitoring Wells	Product	Onsite Water Sediment	Onsite Surface Water
BASE/NEUTRAL EXTRACTABLES								
Polycyclic Aromatic Hydrocarbons								
Acenaphthene							*	
Acenaphthylene			*	*			*	
Anthracene				*			*	
Benzo(a)anthracene	*		*	*			*	
Benzo(a)pyrene	*		*	*			*	
Benzo(b)fluoranthene	*		*	*			*	
Benzo(k)fluoranthene	*		*	*			*	
Benzo(g,h,i)perylene	*		*	*			*	
Chrysene	*		*	*			*	
Dibenzo(a,h) anthracene				*			*	
Fluoranthene	*		*	*			*	
Fluorene				*			*	
Indeno(1,2,3-cd)pyrene	*		*	*			*	
2-Methylnaphthalene			*	*		*		
Naphthalene	*		*	*		*		
Phenanthrene	*		*	*		*	*	
Pyrene	*		*	*			*	
Phthalates								
Butyl benzyl phthalate	*		*	*		*	*	
Bis (2-ethylhexyl) phthalate	*		*	*	*	*	*	
Di-n-butyl phthalate	*			*				
Diethyl phthalate				*		*		
Dimethyl phthalate	*							
Di-n-octyl phthalate	*		*	*	*			
Other Base/Neutrals								
Benzyl alcohol				*				
1,2-Dichlorobenzene	*			*				
1,3-Dichlorobenzene				*				
1,4-Dichlorobenzene				*				
Dibenzofuran				*				
Isophorone						*		
n-Nitrosomethylamine								
n-Nitrosodiphenylamine				*				
1,2,4-Trichlorobenzene				*				

Table 5

CHEMICALS DETECTED, BY MEDIA
FORT WAYNE REDUCTION
Page 3 of 3

Chemical	Onsite Surface Soil	Leachate Seeps	Leachate Seeps Sediment	Test Pits	Monitoring Wells	Product	Onsite Water Sediment	Onsite Surface Water
PESTICIDES/PCBs								
Aldrin				*				
PCB	*		*					
alpha-BHC				*	*			
delta-BHC								
gamma-BHC (lindane)				*				
Heptachlor				*				
INORGANICS								
Aluminium	*	*	*	*	*	Not Analyzed	*	*
Antimony	*			*		Not Analyzed		
Arsenic	*	*		*	*	Not Analyzed		
Barium	*	*	*	*	*	Not Analyzed	*	*
Beryllium				*	*	Not Analyzed		
Cadmium	*	*	*	*	*	Not Analyzed	*	*
Chromium	*	*		*	*	Not Analyzed		*
Cobalt		*	*	*	*	Not Analyzed	*	
Copper		*	*	*	*	Not Analyzed	*	
Cyanide		*		*	*	Not Analyzed		*
Iron	*	*	*	*	*	Not Analyzed		*
Lead	*	*	*	*		Not Analyzed	*	*
Manganese	*	*	*	*	*	Not Analyzed	*	*
Mercury	*	*	*	*		Not Analyzed		
Nickel	*	*	*	*	*	Not Analyzed	*	*
Selenium					*	Not Analyzed		
Silver	*		*	*	*	Not Analyzed		
Tin	*			*	*	Not Analyzed		
Vanadium	*	*	*	*	*	Not Analyzed	*	
Zinc	*			*	*	Not Analyzed		

NOTE: Calcium, magnesium, potassium, and sodium were detected in all media and are not presented here.

Table 6

POTENTIAL CHEMICALS OF CONCERN
FORT WAYNE REDUCTION

Acetone
Antimony
Arsenic
Barium
Benzene
Beryllium
Bis(2-ethylhexyl)phthalate
Cadmium
Chlorobenzene
Chloroform
Chromium
Copper
Cyanide
Dibutyl phthalate
1,1-Dichloroethane
1,1-Dichloroethene
2,4-Dimethyl phenol
Methylene chloride
Ethylbenzene
Lead
Manganese
Mercury
2-Methylphenol
4-Methylphenol
4-Methyl-2-pentanone
Nickel
PAH's
PCBs
Phenol
Silver
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
Trichloroethene
Vanadium
Vinyl chloride
Xylenes
Zinc

PAH's include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

Figure 13 shows each of the potential exposure pathways in relation to the five exposure pathway elements and the potentially exposed populations. Some of these potential exposure pathways can be considered minor in terms of either the potential for release of contaminants or the likelihood for exposure to occur. For example, the potential airborne release of contaminants from the site surface is low. The cover on the site limits release, and the mechanism for release is limited to wind blown erosion. Consequently, exposures associated with this pathway are minor. Similarly, the groundwater is not considered a potential water supply source. Limited groundwater yield excludes this aquifer's use as a water supply source on-site. A municipal water supply is available or could be readily obtained from the City of Fort Wayne (the City of Fort Wayne obtains their water supply from the St. Joseph River). The individual private wells in the area are upgradient from the site and the Maumee River is not used as a water supply in the site's area. Therefore, groundwater discharging to the Maumee River can not be associated with a drinking water exposure pathway.

The major exposure pathways identified for the Fort Wayne Reduction Site are shown in Figure 14. These exposure pathways can be divided into two major categories:

- Exposures associated with the migration of contaminants to the Maumee River

- Exposure associated with use of the site

Contaminants can migrate to the Maumee River through the following mechanisms: the leaching of contaminants from the buried wastes into shallow groundwater and the subsequent discharge of the groundwater to the Maumee River; surface water run off during precipitation events can carry contaminants exposed at the site surface to the river; and flood events may wash out contaminants from the site and carry them to the river. A continual release of contaminants through groundwater discharge to the river would present the most significant source of risk.

The release of contaminants to the Maumee River can result in the direct exposure of aquatic organism to the contaminants. The contaminants may also partition to the sediments where benthic (bottom dwelling) organisms and bottom feeding fish can come into contact with the contaminants. People or wildlife who consume aquatic organism may be exposed to the contaminants (i.e., food chain effects). Exposure may also occur to people who come into contact with river water through recreational activities such as swimming.

People can also be exposed to contaminants through activities that bring them into direct contact with the contaminants on-site. These activities include: trespassing on the site; construction activities undertaken as part of future site development; and exposure of future

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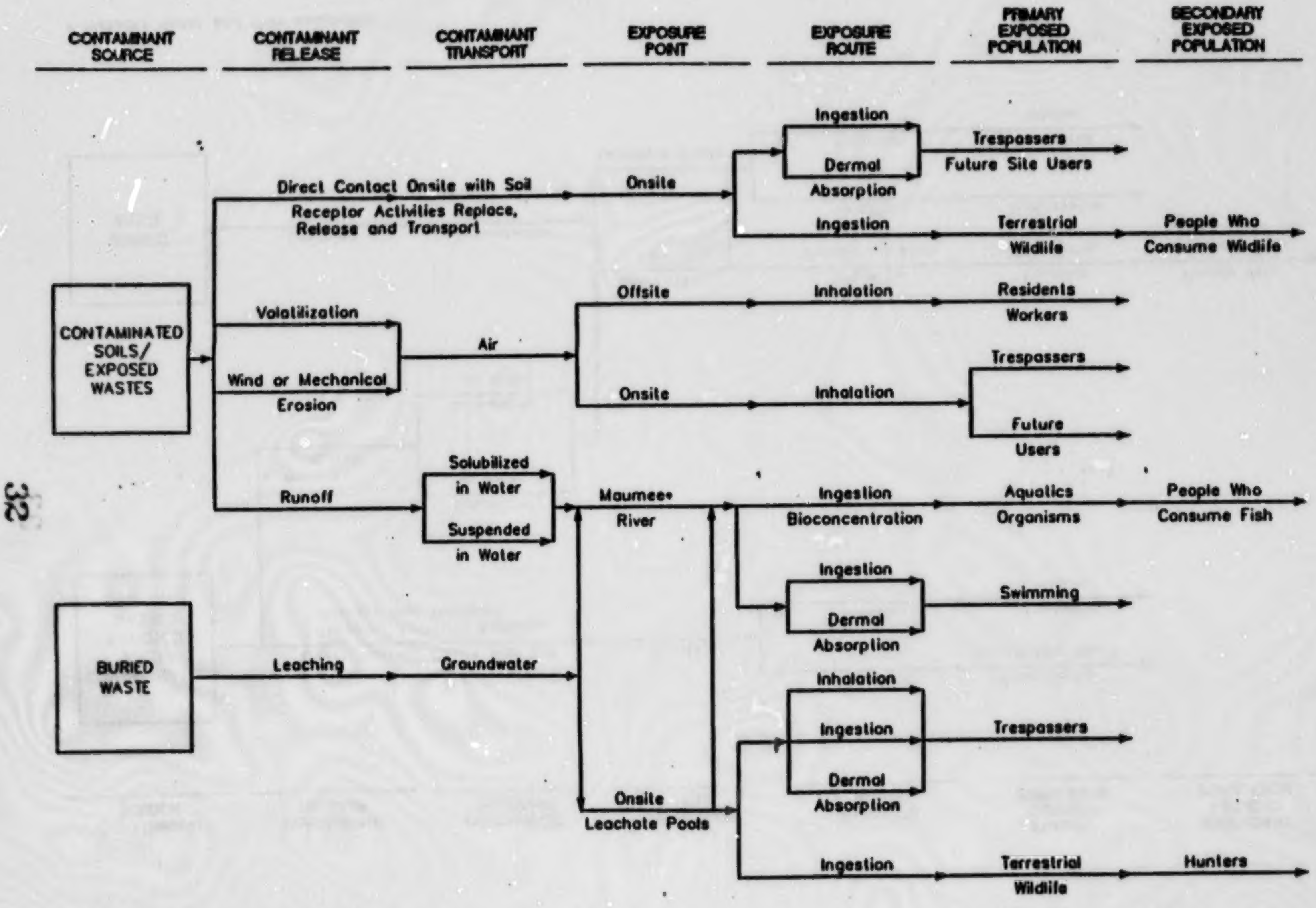
CONTAMINANT SOURCE
CONTAMINANT RELEASE
CONTAMINANT TRANSPORT
EXPOSURE POINT
EXPOSURE ROUTE
PRIMARY EXPOSED POPULATION
SECONDARY EXPOSED POPULATION
CONTAMINATED SOILS/ EXPOSED WASTES
Direct Contact Onsite with Soil
Receptor Activities Replace, Release and Transport
Onsite
Ingestion
Dermal Absorption
Trespassers
Future Site Users
Ingestion
Terrestrial Wildlife
People Who Consume Wildlife
Volatilization
Wind or Mechanical Erosion
Air
Offsite
Inhalation
Residents Workers
Onsite
Inhalation
Trespassers
Future Users
Runoff
Solubilized in Water
Suspended in Water
Maumee* River
Ingestion Bioconcentration
Aquatics Organisms
People Who Consume Fish
Ingestion
Dermal Absorption
Swimming
BURIED WASTE
Leaching
Groundwater
Onsite Leachate Pools
Inhalation
Ingestion
Dermal Absorption
Trespassers
Ingestion
Terrestrial Wildlife
Hunters

* Includes water and river sediments

FIGURE 13
POTENTIAL EXPOSURE PATHWAYS

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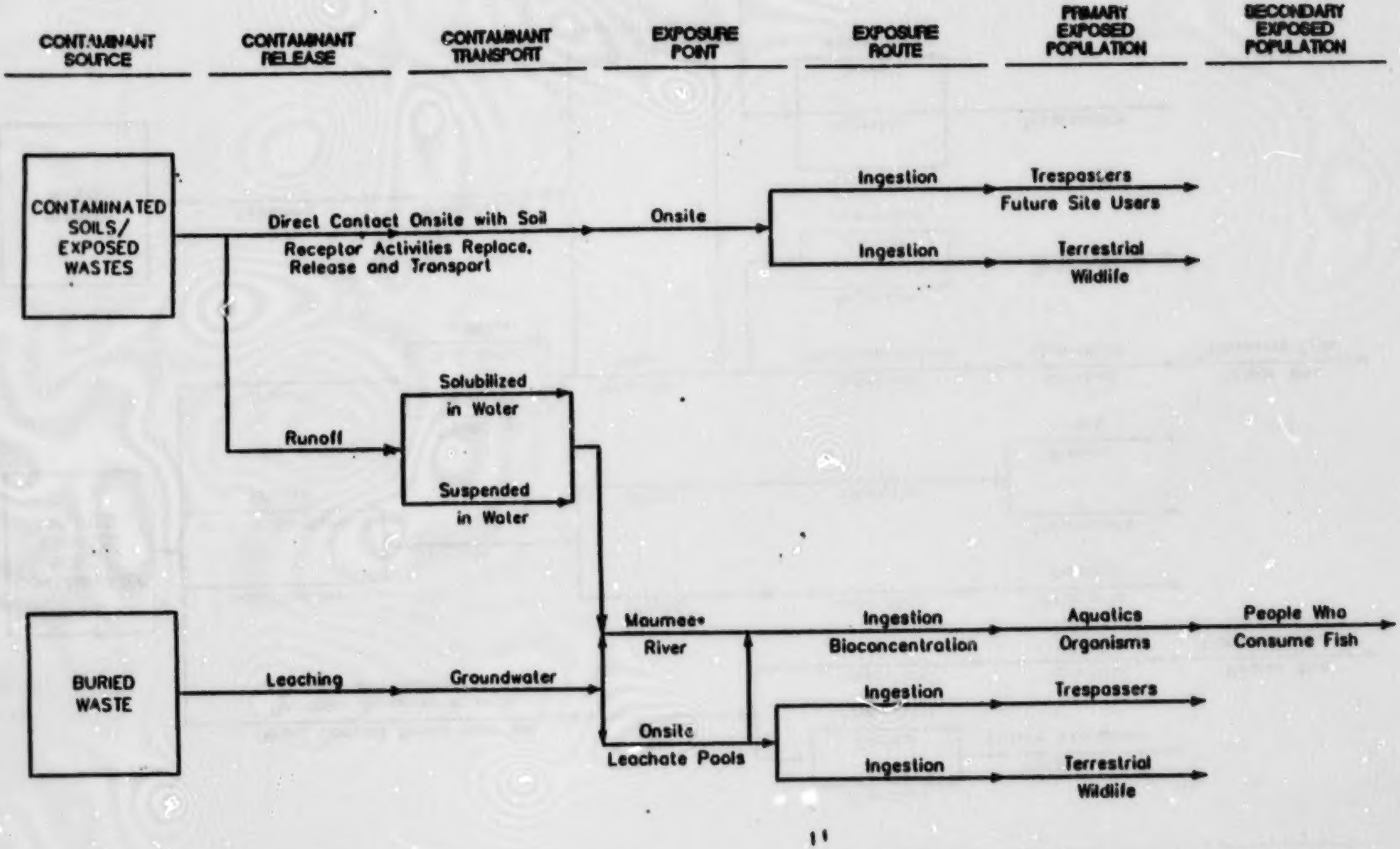
CONTAMINANT SOURCE
CONTAMINANT RELEASE
CONTAMINANT TRANSPORT
EXPOSURE POINT
EXPOSURE ROUTE
PRIMARY EXPOSED POPULATION
SECONDARY EXPOSED POPULATION
CONTAMINATED SOILS/ EXPOSED WASTES
Direct Contact Onsite with Soil
Receptor Activities Replace, Release and Transport
Onsite
Ingestion
Trespassers
Future Site Users
Ingestion
Terrestrial Wildlife
Runoff
Solubilized in Water
Suspended in Water
BURIED WASTE
Leaching
Groundwater
Maumee* River
Onsite Leachate Pools
Ingestion Bioconcentration
Aquatics Organisms
People Who Consume Fish
Ingestion
Trespassers
Ingestion
Terrestrial Wildlife

* Includes water and river sediments

FIGURE 14
POTENTIAL EXPOSURE PATHWAYS OF GREATEST CONCERN
FORT WAYNE REDUCTION SITE

site occupants to contaminants left exposed from site development. Residential or commercial use of the site is considered possible, however, residential development is less likely given the current commercial and industrial land usage of the surrounding property.

Once the exposure pathways are identified, the next step in the exposure assessment is exposure estimation. An estimation of exposure to contaminants requires two items: contaminant concentrations in the media at the point of exposure (exposure point concentration) and an estimate of the intake of the media (media intake rates).

Exposure point concentrations can be estimated by direct measurement at a point of contact or by modeling contaminant release and transport to the exposure point. The exposure assessment for the Fort Wayne Reduction site used both of these approaches.

For exposures occurring to contaminated media on-site (i.e., surface soils, subsurface materials and groundwater seeps and the associated sediments), the highest contaminant concentrations detected (in the appropriate media) were used to represent the high exposure point concentrations. Median exposure point concentrations were estimated wherever possible. In several instances, however, the low frequency of detection of a chemical did not allow estimation of a median exposure point concentration.

A somewhat different approach was taken for exposures at the Maumee River. First, contaminant loadings from the site were calculated from the detected groundwater and groundwater seep contaminant concentrations on-site. Maumee River contaminant concentrations were then projected from the site's contaminant loadings. This approach allowed the relationship between groundwater discharge from the site and the effect of that discharge on the river to be evaluated. This type of approach is consistent with State of Indiana regulations regarding Water Quality Standards and is typically used under the National Pollutant Discharge Elimination System (NPDES) to establish discharge limits. The long-term effect of a discharge on a river's water quality is based on minimum dilution which is represented by the lowest seven consecutive day flow occurring statistically once every 10 years (Q_{7-10}) in a specific reach of the river. Using minimum dilution ensures maximum protection is provided for the aquatic community. In addition, the use of a river's 50th percentile or median flow ($Q_{50\%}$) has been established for evaluating the effect of a discharge on a river's water quality in relation to human consumption of fish. Therefore, Maumee River contaminant concentrations near the site were projected under the following two settings: a mixing zone of 50% of the Q_{7-10} flow and a mixing zone of 25% of the $Q_{50\%}$ flow. Tables 7A and 7B present the projected Maumee River contaminant concentrations near the site due to the site's groundwater discharge. Upstream contaminant contributions were taken into account when assessing the risk associated with the exposure pathways.

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TABLE 7A
DILUTED CONTAMINANT CONCENTRATIONS IN MAUMEE RIVER
USING 1/2 OF LOW FLOW AND 1/4 OF MEAN FLOW CONDITIONS

PHASE I

	Q(7,10)	50% Q(7,10)	Q(50%ile)	25% Q(50%ile)
FT3/SEC	77	38.5	674	168.5
M3/SEC	2.2	1.09	19.1	4.775

TOTAL FLOW m3 per day	FLOW TUBE CH-1 4.15		FLOW TUBE CH-2S 0.92		FLOW TUBE CH03 3.04		FLOW TUBE CH-4S (leachate) 0.64		FLOW TUBE CH-3S 0.41		FLOW TUBE CH-6 0.91		FLOW TUBE CH-9 1.33		FLOW TUBE CH-10 1.01		FLOW TUBE MW-1 0.71		FLOW TUBE MW-2S 0.17		FLOW TUBE P-1 3.21	
	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)	Conc at 1/2 Q(7,10) (ug/l)	Conc at 1/4 Q(50%ile) (ug/l)
ORGANIC COMPOUNDS																						
VOLATILES																						
1,1,1 TRICHLOROETHANE							1.4E-05	3.2E-06											9.0E-09	2.0E-09		
1,1,2,2 TETRACHLOROETHANE																			7.2E-09	1.6E-09		
1,1,2 TRICHLOROETHANE																			5.4E-09	1.2E-09		
1,1 DICHLOROETHANE							2.7E-05	6.2E-06											7.2E-09	1.6E-09		
1,1 DICHLOROETHENE																			7.2E-09	1.6E-09		
1,2 DICHLOROPROPANE																			7.2E-09	1.6E-09		
ACETONE			2.0E-08	4.3E-09	3.6E-06	6.0E-07	3.0E-05	8.0E-06					4.1E-07	9.3E-08								
BENZENE					2.6E-07	3.9E-08													7.2E-09	1.6E-09	5.1E-07	1.2E-07
BROMODICHLOROMETHANE																			3.6E-09	8.2E-10		
BROMOMETHANE																			9.0E-09	2.0E-09		
CARBON DISULFIDE																			9.0E-09	2.0E-09		
CARBON TETRACHLORIDE																			9.0E-09	2.0E-09		
CHLOROBENZENE	2.6E-07	6.0E-08	5.9E-08	1.3E-08	7.3E-07	3.2E-08			2.6E-08	5.9E-09			8.5E-08	1.9E-08	7.5E-08	1.7E-08	6.5E-08	1.0E-08	1.0E-08	4.1E-09	2.0E-07	4.7E-08
CHLOROETHANE					7.7E-07	1.8E-07																
CHLOROFORM																			7.2E-09	1.6E-09		
CHLOROMETHANE																			9.0E-09	2.0E-09		
ETHYLBENZENE							4.6E-05	1.1E-05											7.2E-09	1.6E-09		
METHYLENE CHLORIDE	4.4E-08	1.0E-08	1.8E-07	4.0E-08	6.4E-08	1.5E-08	2.3E-04	5.2E-05					2.0E-08	6.4E-09	3.2E-08	7.4E-09			1.1E-08	2.5E-09		
STYRENE			9.8E-09	2.2E-09											1.1E-08	2.3E-09			9.0E-09	2.0E-09		
TETRACHLOROETHENE							8.8E-07	2.0E-07							1.1E-08	2.3E-09			7.2E-09	1.6E-09		
TOLUENE							1.2E-04	2.8E-05											7.2E-09	1.6E-09		
TOTAL XYLENES			2.0E-08	4.3E-09	2.3E-07	5.2E-08	2.1E-04	4.8E-05											2.1E-08	4.9E-09		
TRANS 1,2-DICHLOROETHENE							5.0E-05	1.1E-05											7.2E-09	1.6E-09		
TRANS 1,3 DICHLOROPROPENE																			7.2E-09	1.6E-09		
TRICHLOROETHENE							1.5E-05	3.3E-06											7.2E-09	1.6E-09		
VINYL CHLORIDE							1.3E-06	3.1E-07											1.1E-08	2.5E-09		
TOTAL VOLATILES	3.1E-07	7.0E-08	2.0E-07	6.5E-08	6.2E-06	9.5E-07	7.5E-04	8.5E-05	2.6E-08	5.9E-09	0	0	5.2E-07	1.2E-07	1.3E-07	2.9E-08	6.5E-08	1.0E-08	2.1E-07	4.8E-08	7.1E-07	1.6E-07
ACIDS																						
2,4-DIMETHYLPHENOL			2.5E-07	5.8E-08	2.0E-05	5.4E-06	5.1E-04	1.2E-04														
2 METHYLPHENOL							6.5E-04	1.5E-04														
4 METHYLPHENOL							1.5E-03	3.5E-04														
PHENOL							1.1E-03	2.6E-04														
TOTAL ACIDS	0	0	2.5E-07	5.8E-08	2.0E-05	5.4E-06	3.4E-03	7.7E-04	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BASE/NEUTRALS																						
2 METHYLNAPHTHALENE																						
BIS(2-ETHYLHEXYL)PHTHALATE	4.0E-07	9.0E-08	7.8E-08	1.8E-08	1.6E-07	3.7E-08			1.2E-07	2.7E-08	8.7E-08	2.0E-08	4.2E-07	9.7E-08	3.8E-07	8.6E-08	3.0E-08	8.4E-09	5.4E-09	1.2E-09	1.4E-07	3.1E-08
BUTYL BENZYL PHTHALATE																						
DI-N-OCTYLPHTHALATE	2.6E-07	6.4E-08	2.9E-08	6.7E-09											6.4E-08	1.5E-08	1.7E-07	3.8E-08				
ISOPHORONE																						
NAPHTHALENE																						
PHENANTHRENE																						
TOTAL B/NS	6.6E-07	1.5E-07	1.1E-07	2.5E-08	1.6E-07	3.7E-08	0	0	1.2E-07	2.7E-08	8.7E-08	2.0E-08	4.2E-07	9.7E-08	4.4E-07	1.0E-07	2.0E-07	4.7E-08	5.4E-09	1.2E-09	1.4E-07	3.1E-08

TABLE 7A

DILUTED CONTAMINANT CONCENTRATIONS IN MAUMEE RIVER
USING 1/2 OF LOW FLOW AND 1/4 OF MEAN FLOW CONDITIONS

PAGE 1

	Q(7,10)	Q(7,10) 50%	Q(50%ile)	Q(50%ile) 25%
FT3/SEC	77	38.5	674	168.5
M3/SEC	2.2	1.09	19.1	4.775

	FLOW TUBE CH-1		FLOW TUBE CH-25		FLOW TUBE CH03		FLOW TUBE CH-45 (leachate)		FLOW TUBE CH-55		FLOW TUBE CH-6		FLOW TUBE CH-9		FLOW TUBE CH-10		FLOW TUBE MW-1		FLOW TUBE MW-25		FLOW TUBE A 3	
TOTAL FLOW m3 per day	0.15		0.92		3.04		0.64		0.41		0.91		1.33		1.01		0.71		0.17		1.21	
	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)	Conc at 1/2 Q(7,10) (mg/l)	Conc at 1/4 Q(50%ile) (mg/l)
PESTICIDES and PCBs																						
ALPHA BHC					1.5E-09	3.5E-10																
TOTAL PESTICIDES and PCBs	0	0	0	0	1.5E-09	3.5E-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INORGANIC COMPOUNDS																						
ALUMINUM	1.9E-05	4.4E-06			2.3E-06	5.2E-07	1.1E-04	2.5E-05			2.0E-07	6.0E-08	5.2E-07	1.2E-07	5.2E-07	7.4E-08					1.8E-06	4.6E-07
ANTIMONY																						
ARSENIC					2.2E-06	3.0E-07	2.5E-07	3.0E-08	1.9E-07	2.3E-08											2.3E-06	5.7E-07
BARIUM	3.3E-06	7.9E-07	1.9E-05	6.0E-07	8.3E-06	1.9E-06	1.0E-06	4.2E-07	2.6E-06	6.0E-07	4.0E-06	9.1E-07	6.7E-06	1.5E-06	2.3E-06	5.5E-07	2.7E-07	6.2E-08	1.7E-07	3.0E-08	1.1E-05	3.2E-06
BERYLLIUM											1.3E-08	2.9E-09							5.4E-09	1.2E-09	6.1E-08	1.4E-08
CADMIUM							1.0E-07	4.1E-08														
CALCIUM	4.0E-03	1.1E-03	2.1E-03	2.4E-04	2.0E-03	6.4E-04	1.0E-03	4.1E-04	7.6E-04	1.7E-04	2.1E-03	4.0E-04	2.4E-03	5.5E-04	1.5E-03	3.4E-04	1.0E-03	3.2E-04	1.0E-04	4.2E-05	6.3E-03	1.4E-03
CHROMIUM							3.5E-07	8.0E-08													1.9E-07	4.5E-08
COBALT									3.0E-08	7.7E-09												
COPPER							9.7E-07	2.2E-07			4.2E-08	9.7E-09					3.2E-08	7.2E-09				
IRON	4.4E-05	9.4E-06	2.3E-05	5.7E-06	5.6E-04	1.3E-04	5.9E-04	1.3E-04	6.4E-03	1.5E-03	1.2E-04	2.0E-05	2.7E-04	6.2E-05	6.2E-05	1.4E-05	3.7E-05	8.4E-06	3.3E-06	7.0E-07	1.5E-03	3.3E-04
LEAD							6.0E-07	1.4E-07														
MAGNESIUM	2.9E-03	6.6E-04	6.0E-04	1.4E-04	2.0E-03	4.5E-04	6.6E-04	1.5E-04	2.0E-04	6.4E-05	9.4E-04	2.2E-04	8.7E-04	2.0E-04	6.4E-04	1.3E-04	4.3E-04	1.0E-04	6.3E-03	1.3E-03	4.0E-03	9.2E-04
MANGANESE	5.1E-06	7.1E-07	1.2E-06	2.7E-07	5.1E-06	1.2E-06	2.0E-05	4.5E-06	1.4E-05	3.1E-06	1.9E-05	4.2E-06	5.0E-06	1.3E-06	3.3E-06	7.5E-07	9.4E-07	2.2E-07	6.1E-08	1.0E-08	1.2E-05	2.5E-06
MERCURY																						
NICKEL	2.4E-07	5.9E-08	5.9E-08	1.3E-08	1.6E-07	3.0E-08	9.3E-07	2.2E-07	1.0E-07	2.3E-08	3.0E-07	6.0E-08	1.2E-07	2.0E-08	6.7E-08	1.5E-08					1.2E-06	2.8E-07
POTASSIUM	1.5E-04	2.9E-05	3.4E-05	7.7E-06	1.0E-03	2.3E-04	1.4E-04	3.2E-05	8.4E-05	1.9E-05	2.0E-04	4.5E-05	2.5E-04	5.5E-05	7.0E-05	1.0E-05	1.5E-05	3.4E-06	4.2E-06	9.7E-07	5.5E-04	1.3E-04
SELENIUM																						
SILVER																			1.5E-08	2.3E-09		
SODIUM	1.7E-03	2.0E-04	9.2E-04	2.1E-04	3.7E-03	8.3E-04	2.2E-03	5.0E-04	5.5E-04	1.3E-04	1.5E-03	3.4E-04	1.6E-03	3.7E-04	8.4E-04	1.9E-04	5.0E-03	1.3E-03	1.7E-05	3.8E-06	1.2E-02	2.8E-03
THALLIUM																						
TIN											2.4E-07	5.9E-08										
VANADIUM							3.3E-07	1.2E-07											4.0E-09	1.4E-09	1.4E-07	3.3E-08
ZINC	3.7E-06	8.3E-07	2.1E-07	4.9E-08	2.1E-06	4.7E-07	2.6E-06	6.1E-07	2.1E-07	4.0E-08	4.6E-07	1.1E-07	5.3E-07	1.3E-07	1.3E-07	2.9E-08	3.0E-07	6.9E-08	3.7E-08	7.4E-09	2.6E-06	5.8E-07
CONVENTIONAL ANALYSES (MG/L)																						
AMMONIA	2.2E-05	5.4E-06	1.2E-05	2.7E-06	1.3E-04	8.1E-05			3.0E-05	7.7E-06	1.1E-04	2.4E-05	1.7E-04	3.9E-05	2.4E-05	3.9E-06	1.5E-06	3.3E-07	5.6E-07	8.2E-08	3.9E-04	2.0E-05
CHLORIDE	9.7E-04	2.2E-04	1.4E-03	3.1E-04	3.2E-03	7.0E-04			6.4E-04	1.4E-04	1.3E-03	3.1E-04	2.3E-03	5.3E-04	1.7E-03	2.7E-04	5.3E-04	1.2E-04			1.4E-02	1.7E-03
NITRATE + NITRITE																						
SULFATE AS SO4	1.1E-02	2.5E-03	7.1E-04	1.6E-04					4.2E-04	9.4E-05	3.0E-04	8.0E-05	5.4E-04	1.2E-04	4.1E-04	9.3E-05	1.0E-03	4.0E-04	1.1E-04	2.4E-05		
TOTAL ALKALINITY	7.2E-02	1.6E-02	5.0E-03	1.3E-03	2.1E-02	4.9E-03			5.1E-03	7.5E-04	1.2E-02	2.8E-03	1.2E-02	2.8E-03	7.1E-03	1.6E-03	2.8E-03	6.4E-04	7.1E-04	1.6E-04	1.9E-02	8.9E-03

Phase II

TABLE 7B
DILUTED CONTAMINANT CONCENTRATIONS IN MAUMEE RIVER
USING 1/2 OF LOW FLOW AND 1/4 OF MEAN FLOW CONDITIONS

	ft3/sec	m3/sec
50% of Q(7,10)=	38.5	1.09
25% of Q(50%ile)=	168.5	4.77

	FLOW TUBE CH-1		FLOW TUBE CH-2S		FLOW TUBE CH-3		FLOW TUBE CH-3S		FLOW TUBE CH-6		FLOW TUBE CH-9		FLOW TUBE CH-10		FLOW TUBE NW-1		FLOW TUBE NW-2S		FLOW TUBE N-3	
TOTAL GW FLOW IN m3 per DAY	0.15		0.92		3.04		0.41		0.91		1.33		1.01		0.71		0.17		3.21	
	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)
ORGANIC COMPOUNDS																				
VOLATILES																				
BENZENE					3.5E-07	8.1E-08	2.1E-08	4.8E-09	3.2E-08	7.3E-09									5.1E-07	1.2E-07
CHLOROBENZENE			4.9E-08	1.1E-08	2.9E-07	6.6E-08														
METHYLENE CHLORIDE											4.2E-08	9.7E-09					9.5E-08	2.2E-08		
TOLUENE																				
TOTAL XYLENES					2.9E-07	6.6E-08														
TOTAL VOLATILES			4.9E-08	1.1E-08	9.3E-07	2.1E-07	2.1E-08	4.8E-09	3.2E-08	7.3E-09	4.2E-08	9.7E-09	0	0	0	0	9.5E-08	2.2E-08	5.1E-07	1.2E-07
ACIDS																				
2, 4-DIMETHYLPHENOL			1.8E-07	4.0E-08	2.7E-05	6.2E-06														
TOTAL ACIDS	0	0	1.8E-07	4.0E-08	2.7E-05	6.2E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BASE/NEUTRALS																				
DI-N-BUTYL PHTHALATE							8.5E-09	1.9E-09												
DIETHYL PHTHALATE											4.2E-08	9.7E-09								
HEXACHLOROETHANE																				
ISOPHORONE	2.2E-07	5.0E-08																		
TOTAL B/Ns	2.2E-07	5.0E-08	0	0	0	0	8.5E-09	1.9E-09	0	0	4.2E-08	9.7E-09	0	0	0	0	0	0	0	0
PESTICIDES and PCBs																				
TOTAL PESTICIDES and PCBs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Phase II

TABLE 7B
DILUTED CONTAMINANT CONCENTRATIONS IN MAUMEE RIVER
USING 1/2 OF LOW FLOW AND 1/4 OF MEAN FLOW CONDITIONS

	ft3/sec	m3/sec
50% of Q(7,10)=	38.5	1.09
25% of Q(50%ile)=	168.5	4.77

	FLOW TUBE CH-1		FLOW TUBE CH-2S		FLOW TUBE CH-3		FLOW TUBE CH-3S		FLOW TUBE X-6		FLOW TUBE CH-9		FLOW TUBE CH-10		FLOW TUBE SH-1		FLOW TUBE MW-2S		FLOW TUBE B-3	
TOTAL GW FLOW IN m3 per DAY	0.15		0.92		3.04		0.41		0.91		1.33		1.01		0.75		0.17		3.21	
	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)	CONC AT 1/2 Q(7,10) (mg/l)	CONC AT 1/4 Q(50%ILE) (mg/l)
FILTERED INORGANIC COMPOUNDS																				
ALUMINUM	6.9E-06	1.4E-06	2.7E-06	6.3E-07							1.4E-05	3.2E-06					2.1E-07	4.9E-08		
ANTIMONY																				
ARSENIC					2.1E-06	4.7E-07	1.7E-07	3.9E-08											1.3E-06	3.5E-07
BARIUM	9.6E-06	2.2E-06	4.2E-06	9.7E-07	8.2E-06	1.9E-06	6.2E-06	1.4E-06	3.9E-06	9.0E-07	6.0E-06	1.6E-06	2.2E-06	4.9E-07			3.1E-07	7.1E-08	1.2E-05	2.7E-06
BERYLLIUM																				
CADMIUM							2.0E-08	4.3E-09											1.7E-07	3.8E-08
CALCIUM	1.2E-02	2.8E-03	1.1E-03	2.5E-04	2.0E-03	6.5E-04	6.3E-04	1.5E-04	2.0E-03	6.5E-04	2.3E-03	5.3E-04	1.5E-03	3.4E-04	1.3E-03	3.1E-04	1.9E-04	4.3E-05	6.2E-03	1.4E-03
CHROMIUM											1.7E-07	3.9E-08								
COBALT																				
COPPER			4.7E-07	1.1E-07	1.4E-06	3.1E-07	1.3E-07	3.1E-08	2.2E-07	5.1E-08	4.1E-07	9.3E-08							1.1E-06	2.4E-07
CYANIDE																				
IRON	6.3E-04	1.4E-04	1.2E-05	2.7E-06	4.7E-04	1.1E-04	8.8E-05	2.0E-05	1.2E-04	2.7E-05	2.3E-04	5.2E-05	3.6E-05	8.2E-06	2.5E-05	5.8E-06	1.3E-06	2.6E-07	8.4E-04	2.0E-04
LEAD	2.6E-07	5.9E-08	5.7E-08	1.3E-08	1.3E-07	2.9E-08	1.9E-08	4.3E-09	3.8E-08	8.6E-09	6.5E-08	1.5E-08	3.5E-08	8.1E-09	3.7E-08	8.5E-09			1.7E-07	3.8E-08
MAGNESIUM	2.8E-03	6.4E-04	5.8E-04	1.3E-04	1.9E-03	4.3E-04	3.4E-04	7.7E-05	1.1E-03	2.5E-04	8.3E-04	1.9E-04	6.4E-04	1.5E-04	4.1E-04	9.3E-05	6.2E-05	1.4E-05	4.0E-03	9.3E-04
MANGANESE	1.1E-04	2.5E-05	5.9E-07	1.3E-07	5.2E-06	1.2E-06	6.3E-06	1.4E-06	1.8E-05	4.2E-06	5.9E-06	1.3E-06	1.5E-06	3.4E-07	7.8E-07	1.8E-07	7.0E-08	1.6E-08	9.5E-06	2.2E-06
MERCURY																				
NICKEL	1.3E-06	2.7E-07	1.4E-07	3.1E-08			1.2E-07	2.8E-08	2.9E-07	6.6E-08	3.9E-07	9.0E-08					2.9E-08	6.3E-09	1.3E-06	3.3E-07
POTASSIUM	6.6E-05	1.5E-05	3.1E-05	7.1E-06	6.3E-04	1.5E-04	1.5E-04	3.5E-05	2.4E-04	5.5E-05	1.8E-04	4.1E-05	4.4E-05	1.0E-05	4.1E-05	9.5E-06	2.8E-06	6.5E-07	6.0E-04	1.6E-04
SELENIUM			3.2E-08	2.4E-09	1.4E-07	3.3E-08	2.4E-08	5.4E-09												
SILVER			8.8E-07	2.4E-07																
SODIUM	4.5E-03	1.0E-03	1.0E-03	2.4E-04	3.6E-03	8.2E-04	6.2E-04	1.4E-04	1.3E-03	2.9E-04	1.6E-03	3.8E-04	3.1E-04	1.0E-04	7.9E-03	1.8E-03	1.9E-03	4.3E-04	1.2E-02	2.7E-03
THALLIUM																				
VANADIUM	8.4E-07	1.9E-07	1.4E-07	3.1E-08			6.9E-08	1.6E-08	1.6E-07	3.7E-08	3.0E-07	6.8E-08			2.0E-07	4.7E-08	4.3E-08	9.8E-09	8.5E-07	1.9E-07
ZINC	3.0E-06	6.9E-07	8.5E-07	1.9E-07	2.3E-06	5.2E-07	3.3E-07	7.6E-08	7.1E-07	1.6E-07	1.5E-06	3.5E-07	1.1E-06	2.4E-07	3.5E-07	8.1E-08	8.6E-08	2.0E-08	9.3E-06	2.1E-06
CONVENTIONAL ANALYSES																				
AMMONIA	4.0E-05	1.1E-05	3.3E-05	7.4E-06	2.6E-04	6.0E-05	7.0E-05	1.8E-05	6.7E-05	1.5E-05	2.7E-04	6.1E-05	3.9E-05	8.8E-06	1.5E-06	3.5E-07	1.8E-07	4.1E-08	3.7E-04	8.6E-05
CHLORIDE	1.0E-04	2.3E-05	9.0E-04	2.3E-04	3.2E-03	7.4E-04	1.2E-03	2.8E-04	1.3E-03	3.1E-04	2.3E-03	5.2E-04	1.6E-03	2.6E-04	5.7E-03	1.3E-03	1.8E-05	4.1E-06	1.4E-02	3.1E-03
NITRATE/NITRITE	4.8E-05	1.1E-05	9.8E-06	2.2E-06	1.9E-05	4.4E-06	5.4E-06	1.5E-06	1.2E-05	2.6E-06	1.3E-05	2.9E-06	1.1E-05	2.5E-06	2.8E-06	6.4E-07	1.8E-07	4.1E-08	1.4E-05	3.1E-06
SULFATE	2.4E-03	5.4E-04	1.7E-03	2.5E-04	2.3E-04	5.2E-05	3.9E-04	9.0E-05	6.7E-04	1.1E-04	7.5E-04	1.7E-04	6.0E-04	1.4E-04	1.8E-03	4.1E-04	1.2E-04	2.8E-05	1.6E-03	3.7E-04

Tables 8 and 9 present the exposure point concentrations and media intake rates used in the risk assessment respectively.

D. Risk Characterization

This portion of the risk assessment evaluated the various exposure pathways and identified, by media, the potential risks to human health and the environment associated with the site's contaminants.
The eastern (municipal landfill) portion of the site was determined not to pose a risk to human health or the environment. Contaminant levels in the surface soils of this area were below levels indicating a direct contact threat. The site history and the site's waste disposal practices indicate that the vast majority of waste disposed in this portion of the site was municipal refuse, though minimal amounts of hazardous materials may have been disposed of within the landfill. This information, plus the groundwater monitoring data, indicate that no current threat to the Maumee River exists from the groundwater discharging to the river.

Under current site conditions, direct contact by trespassers to exposed contaminants in the surficial soils on the western portion of the site, especially the wire disposal area, is a concern. _The primary contaminant of concern is lead. Inadvertent ingestion of groundwater seeps along the banks of the river is also a concern because of the heavy metals, phenolic compounds, and xylene present in the seeps.

If the site is developed, exposure to the wastes currently buried in the western portion of the site could occur. Contaminants are present in the subsurface at concentrations associated with potential health effects, especially near the former pit and general industrial waste areas. Chemicals of concern include phthalates, heavy metals, phenolic compounds, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs).

The potential for aquatic effects as a result of the contaminated groundwater discharging to the Maumee River exists. Projected contaminant levels in the river (after the mixing of groundwater with river water) do not exceed the chronic State water quality standards for the protection of aquatic organisms. The concentrations of contaminants in the groundwater and groundwater seeps do however, exceed acute State water quality standards for the protection of aquatic organisms at the point of discharge into the river for several metals, phenolic compounds, and VOCs. The release of contaminated groundwater to the river appears to be continuous and the test pit evaluation indicates waste materials, especially from the former pit and general industrial waste areas, are potential source areas for future releases.

Table 8

CONCENTRATIONS OF CONTAMINANTS USED TO ESTIMATE EXPOSURE
FORT WAYNE REDUCTION

Chemical	Leachate, ug/l Maximum Concentration Observed	Leachate, ug/l Median Concentration Observed	Onsite Surface Soil, mg/kg Maximum Concentration Observed	Onsite Surface Soil, mg/kg Median Concentration Observed	Onsite Sediment, mg/kg Maximum Concentration Observed	Onsite Sediment, mg/kg Median Concentration Observed	Projected River Concentration, ug/l 30% of Q7,10 Flow	Projected River Concentration, ug/l 25% of Median Flow
Acetone	NA	NA	NA	NA	0.029	0.014	0.041	0.0095
Antimony	BDL	BDL	95	BDL	BDL	BDL	-	-
Arsenic	90	36	21	BDL	NA	NA	0.005	0.0011
Barium	6,340	320	1,070	BDL	227	80	0.046	0.01
Benzene	12	3	NA	NA	0.023	0.003	0.00078	0.00018
Bis(2-ethylhexyl)-phthalate	NA	NA	1,000	0.62	34	0.24	0.0018	0.00041
Cadmium	330	10	223,000	89,600	15.3	0.8	0.00018	0.000041
Chlorobenzene	3	BDL	NA	NA	0.011	BDL	0.001	0.00023
Chromium	920	42	298	23	NA	NA	0.00054	0.00012
Copper	NA	NA	9,090	80	369	76	0.001	0.00024
Cyanide	10	BDL	1	b	BDL	BDL	-	-
1,1-Dichloroethane	4,000	BDL	NA	NA	BDL	BDL	0.027	0.0062
1,1-Dichloroethene	1	BDL	NA	NA	BDL	BDL	0.0000072	0.0000016
Methylene chloride	3,400	b	NA	NA	BDL	BDL	0.231	0.052
Ethylbenzene	6,900	BDL	NA	NA	330	BDL	0.046	0.011
Lead	950	80	3,940	143	180	57	0.0006	0.00014
Manganese	13,000	1,550	771	411	170	BDL	0.083	0.019
Mercury	2.0	BDL	.36	.12	0.60	BDL	-	-
2-Methyl phenol	97,000	0.325	0.010	BDL	78	BDL	0.65	0.15
4-Methyl phenol	160,000	0.325	0.340	BDL	120	BDL	1.1	0.25
4-Methyl-2-pentanone	3,100	BDL	NA	NA	BDL	BDL	-	-
Nickel	1,400	30	34	BDL	62	124	0.0032	0.00074
PAHs	BDL	BDL	2.0	.3	1.6	BDL	-	-
PCB	BDL	BDL	19.2	0.34	2.2	BDL	-	-
Phenol	170,000	BDL	63	0.83	120	BDL	1.1	0.26
Selenium	BDL	BDL	BDL	BDL	NA	NA	-	-
Silver	BDL	BDL	6.9	BDL	3	BDL	-	-
Tetrachloroethene	130	BDL	NA	NA	BDL	BDL	0.0009	0.00021
Toluene	10,000	BDL	NA	NA	190	0.15	0.12	0.028
1,1,1-Trichloroethane	2.1	BDL	NA	NA	BDL	BDL	0.014	0.0032
Trichloroethene		BDL	NA	NA	BDL	BDL	0.016	0.0035
Vanadium	1,330	52	43	22	NA	NA	0.00068	0.00016
Vinyl chloride	200	BDL	NA	NA	30	25	0.0014	0.00031
Xylenes	31,000	BDL	NA	NA	1600.	b	0.21	0.048
Zinc	NA	NA	2,030	137	NA	NA	-	-

NA = Not Analyzed or Not Reportable because of quality control concerns.

BDL = Below Detection Limit

a. Concentrations in surface water based on a mixing zone of 30% of the 'Q7,10' flow and 25% of the median flow for the Maumee River.

b. 50% of measurements are above and 50% of measurements are below detection limit.
Median concentration cannot be determined.

c. PAHs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.

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Table 9

SUMMARY OF EXPOSURE ASSUMPTIONS USED FOR FORT WAYNE REDUCTION

Media	Exposure Route	Setting	Daily Media Intake	Body Weight	Lifetime Average Media Intake	Period in Which Exposure Might Occur	Exposure Frequency
Evaluation of Noncarcinogenic Effects by Comparison to Reference Doses							
Leachate	Ingestion	Trespass	50 ml/day	35-kg	Not Applicable	Childhood (10 year old used for evaluation purposes)	Based on a single day
Soil/sediment	Ingestion	Trespass	0.1 gram/day	35-kg	Not Applicable	Child Between Ages 10-18	Based on a single day
Soil/sediment	Ingestion	Trespass	0.1 gram/day	70-kg	Not Applicable	Adult Between Ages 18-60	Based on a single day
Surface water	Ingestion	Swimming	50 ml/day	35-kg	Not Applicable	Child Between Ages 10-18	Based on a single day
Evaluation of Excess Lifetime Cancer Risk							
Leachate	Ingestion	Trespass	50 ml/day	Over lifetime: 70-kg	0.000000028 l/kg body wt/day	Childhood	Once
Soil/sediment	Ingestion	Trespass	0.1 gram/day	Over lifetime: 70-kg	0.00003 g/kg body wt/day	20 year period within lifetime	1 days per week 6 months per year 20 years
Soil/sediment	Ingestion	Trespass	0.1 gram/day	Over lifetime: 70-kg	0.00000006 g/kg body wt/day	Once within lifetime	1 day
Surface water	Ingestion	Swimming	50 ml/day	Over lifetime: 70-kg	0.00000425 l/kg body wt/day	Between Ages 10-18	7 days per year 5 years
Surface water	Ingestion	Swimming	50 ml/day	Over lifetime: 70-kg	0.00000012 l/kg body wt/day	Between Ages 10-18	1 day

The projected river contaminant concentrations after mixing are lower than levels associated with adverse health effects from swimming or fish consumption.

Table 10 summarizes the risk characterization for the site.

VI. ALTERNATIVES DEVELOPMENT

A. Remedial Action Goals

The National Contingency Plan (NCP) (40 CFR Part 300) and CERCLA, as amended by SARA establish the remedial action objectives for the site. In evaluating the findings of the RI and the Risk Assessment, the following media on the western portion of the site were identified as presenting either an existing or a potential future unacceptable public health or environmental risk at the site:

- Surface soils
- Subsurface soils/wastes
- Groundwater/groundwater seeps

Therefore, the following were identified as the specific remedial action goals for the site:

- Surface Soil--To provide adequate protection of public health and the environment by limiting direct contact with, and erosion of, on-site surface soils in the western portion of the site.

- Subsurface soils/wastes--To provide adequate protection of public health and the environment by limited direct contact with, and future releases to the Maumee River from the subsurface soils and wastes in the western portion of the site.

- Groundwater/Groundwater Seeps--To provide adequate protection of public health and the environment by limiting discharge of, and direct contact with, groundwater/groundwater seeps in the western portion of the site.

- Municipal landfill--Since no unacceptable public health or environmental risk has been associated with this area, the remedial action goals are to ensure future migration of groundwater will not present a threat to the river and adequate cover is present to prevent erosion resulting in a direct contact threat or washout of the wastes to the river.

Consistent with the remedial action goals, three operable units were developed for the site: the soil on the western portion of the site, the municipal landfill and groundwater.

Table 10
SUMMARY OF RISK ASSESSMENT--FORT WAYNE REDUCTION SITE

Exposure Pathway	Exposure Point	Exposed Population	Risk Characterization Summary	Comment
Direct Contact: Ingestion	Surface soil onsite	Trespassers	Reference dose exceeded by highest detected concentration of lead. No reference doses exceeded by median concentrations. Excess lifetime cancer risk: 4×10^{-7} to 9×10^{-11} based on the highest concentrations of PAHs and PCB. Excess lifetime cancer risk: 1×10^{-7} to 3×10^{-11} based on median concentrations of PAHs and PCB.	Surface contamination is restricted primarily to the western portion of the site. Exposure under current land use would be restricted to trespassers (for example, children playing onsite). The site is surrounded mainly by commercial/industrial operations. Because of this, it is anticipated that the number of potentially exposed individuals would be small and their exposure frequency low.
Direct Contact: Ingestion	Buried waste and subsurface soil	Construction workers Future site occupants	Concentrations of the following chemicals exceeded their risk-based target levels: cadmium, copper, chromium, lead bis (2-ethylhexyl)phthalate, ethylbenzene, 2-methyl phenol, methylene chloride, PAHs, PCB, tetrachloroethene, and trichloroethene.	This analysis assumes that site development will occur without any remediation. For exposure to occur, excavation is required. Give current land use and zoning, commercial development is more likely than residential use, at least in the near term.
Direct Contact: Ingestion	Groundwater seep related sediment	Trespassers	Reference doses are not exceeded by any concentrations. Excess lifetime cancer risk: 8×10^{-7} to 2×10^{-10} based on the highest detected concentrations of PAHs and PCB. Excess lifetime cancer risk: 3×10^{-7} to 5×10^{-11} based on median concentrations of PAHs and PCB.	Access to most of the seep areas are limited to times when the river stage is low. Exposure under current land use would be restricted to trespassers (for example, children playing along the river bank). The site is surrounded mainly by commercial/industrial operations. Because of this, it is anticipated that the number of potentially exposed individuals would be small and their exposure frequency low. If character of the releases change, then exposure levels could also change.
Direct Contact: Ingestion	Groundwater seeps	Trespassers	Reference dose exceeded by highest detected concentration of cadmium, 2-methyl phenol, 4-methyl phenol, phenol, and xylene.	Access to most of the seep areas are limited to times when the river stage is low. Exposure under current land use would most likely occur to children playing along the river bank who may attempt to drink the seeps material. However, taste and odor of seeps would limit the palatibility of the seeps. The site is surrounded mainly by commercial/industrial operations. Because of this, it is anticipated that the number of potentially exposed individuals would be small and their exposure frequency low. If character of the releases change, then exposure levels could also change.
Groundwater Migration: Discharge to Maumee River	Maumee River	Aquatic Organisms	Acute aquatic criteria exceeded by groundwater, including seeps, prior to discharge to the river for the following chemicals: barium, cadmium, copper, 2,4-dimethyl phenol, ethylbenzene, 2-methyl phenol, 4-methyl phenol, methylene chloride, toluene, and xylene.	No impacts projected for the river after a mixing zone. While concentrations exceed acute criteria prior to discharge, dilution will occur upon discharge. Contaminant levels at release may have localized aquatic impacts. Potential exists for future releases to river from buried wastes. If character of the releases change, then exposure levels could also change. Assessment does not address sediment impacts.
Groundwater Migration: Discharge to Maumee River	Maumee River	People who consume fish caught in Maumee River People who swim in Maumee River	Projected contaminant levels in Maumee River (based on existing groundwater data) below levels of concern for fishing and swimming.	Potential exists for future releases to river from buried wastes. If character of the releases change, then exposure levels could also change.

B. Technology Screening

Appropriate remedial technologies and process options were screened in the FS. The goal of the screening was to simplify the selection of technologies and process options assembled into alternatives without limiting flexibility during remedial design. The screening criteria included: effectiveness; implementability; and relative capital and operation and maintenance costs. During the screening process, primary focus was on the effectiveness and implementability of the remedial technologies and process options, with less focus on the relative capital and operation and maintenance costs.

C. Alternative Development

Using the established remedial action goals, those remedial technologies and process options remaining from the screening process were assembled into remedial alternatives. In general, a range of remedial alternatives were developed. This range included to the extent feasible:

- A no action alternative
- A containment alternative involving little or no treatment of contaminants
- Treatment alternatives ranging from one that eliminates the need for long-term management, to one that significantly and permanently reduces the toxicity, mobility or volume of contaminants.

Based on this general array, remedial alternatives for the Fort Wayne Reduction site were assembled to progress from addressing groundwater contamination alone to more complex combinations addressing surface and subsurface soils in addition to groundwater contamination.

VII. SITE SPECIFIC REQUIREMENTS

An explanation of a few site specific requirements is needed initially to provide a more complete understanding of site conditions and/or simplify the alternative descriptions. A detailed description of the following site specific requirements will be provided prior to presenting the alternative descriptions:

- Flood protection and wetlands
- Access restrictions
- Determination of risk-based areas for excavation

A. Flood Protection and Wetlands

As indicated previously, a portion of the site lies within the 100-year floodplain and two wetlands are located adjacent to the municipal landfill. Therefore, providing adequate flood protection and protecting wetlands is an essential component of the remedial activities at the site.

The remedial alternatives for the site need to address proper floodplain management and the protection of wetlands. The following guidelines were considered in developing the remedial alternatives:

- Work in the flood plain should not obstruct or adversely affect the efficiency of the floodway.
- Scheduled work in the floodplain should be planned for times when flooding is least expected.
- Work in and adverse impacts to the wetlands should be avoided where possible.

1. Flood Protection

The primary objective of flood protection at the site is protecting the landfill embankment from river scour during flood events. Several measures were considered for minimizing flood damage. These measures were:

- Construction of an earth berm to prevent flood waters from inundating areas where waste is buried.
- Placement of rip-rap from the river channel to the 100-year flood level.

Both these measures were rejected because they would either cause severe encroachment on the floodway or destroy approximately 1-acre of wetlands.

The proposed flood protection measure is to grade the existing site embankment to a maximum one vertical to three horizontal slope, establish vegetation, and install erosion mats from the top of the embankment to beyond the toe. Construction would be followed by biannual inspections and periodic maintenance to ensure the integrity of the embankment. The recommended method of flood protection has been discussed with the Indiana Department of Natural Resources (IDNR) and the Army Corps of Engineers (ACOE). Both of these agencies have a major interest in flood control on the Maumee River and design criteria for construction in the 100-year floodplain.

The proposed flood protection measure is implementable at the site. Minimal alteration of the floodway near the site, with no alteration of the ordinary floodway, will occur.

A secondary objective of flood protection at the site is preventing short-term effects such as: the release of contaminants to the Maumee River and a decrease in the progress of work during the construction phase. The site is not impacted by the river for flows at or below the ordinary high river elevation. The flat shelf of land north of the site embankment is subject to flooding, especially during the months from November through June. Therefore, construction activities in this low-lying area will be scheduled around these flood-prone months.

2. Protection of Wetlands

Protection of the wetlands abutting the embankment of the municipal landfill will be accomplished by preventing runoff and sediment from entering these areas by using erosion control techniques during construction. Such techniques may include temporary drainage ditches, check dams, and plastic covers over exposed cuts. The wetlands will not be used for staging of equipment or materials.

Some destruction of the wetlands between the river and the municipal landfill may occur. If construction at the site causes a loss of wetlands, the loss will be mitigated by placing a weir along Herber Drain subsequently increasing the area of the on-site wetlands directly east of the municipal landfill.

B. Access Restrictions

Each remedial alternative for the site includes access restrictions: a site fence, warning signs, and deed restrictions on land usage.

A 6-foot high fence would be installed on or near the property lines to keep intruders off the site and protect the integrity of the cap or cover. The fence is not installed along the river due to maintenance problems associated with flood damage. Warning signs are however placed along the toe of the site embankment near the river to alert potential intruders to stay off the site.

Deed restrictions would be implemented to control future property use and prohibit the use of groundwater or the installation of wells on-site for a water supply source.

C. Determination of Risk-Based Areas for Excavation

Two of the technologies assembled into alternatives were excavation and incineration. Prior to evaluating or developing an alternative containing either of these technologies, it was necessary to determine which areas of the site required excavation. These areas were determined based on the hazards identified in the risk assessment.

The risk assessment identified two major exposure concerns:

- Environmental concerns: releases of contaminants to the Maumee River, primarily through groundwater.
- Human health concerns: direct contact with waste and contaminated soil as a result of future development at the site.

The excavation areas were determined by first considering the separate exposure concerns (i.e., environmental release vs. human contact) at the site. These are those areas associated with:

- The release to the groundwater.
- The protection of public health.
- The buried drums.

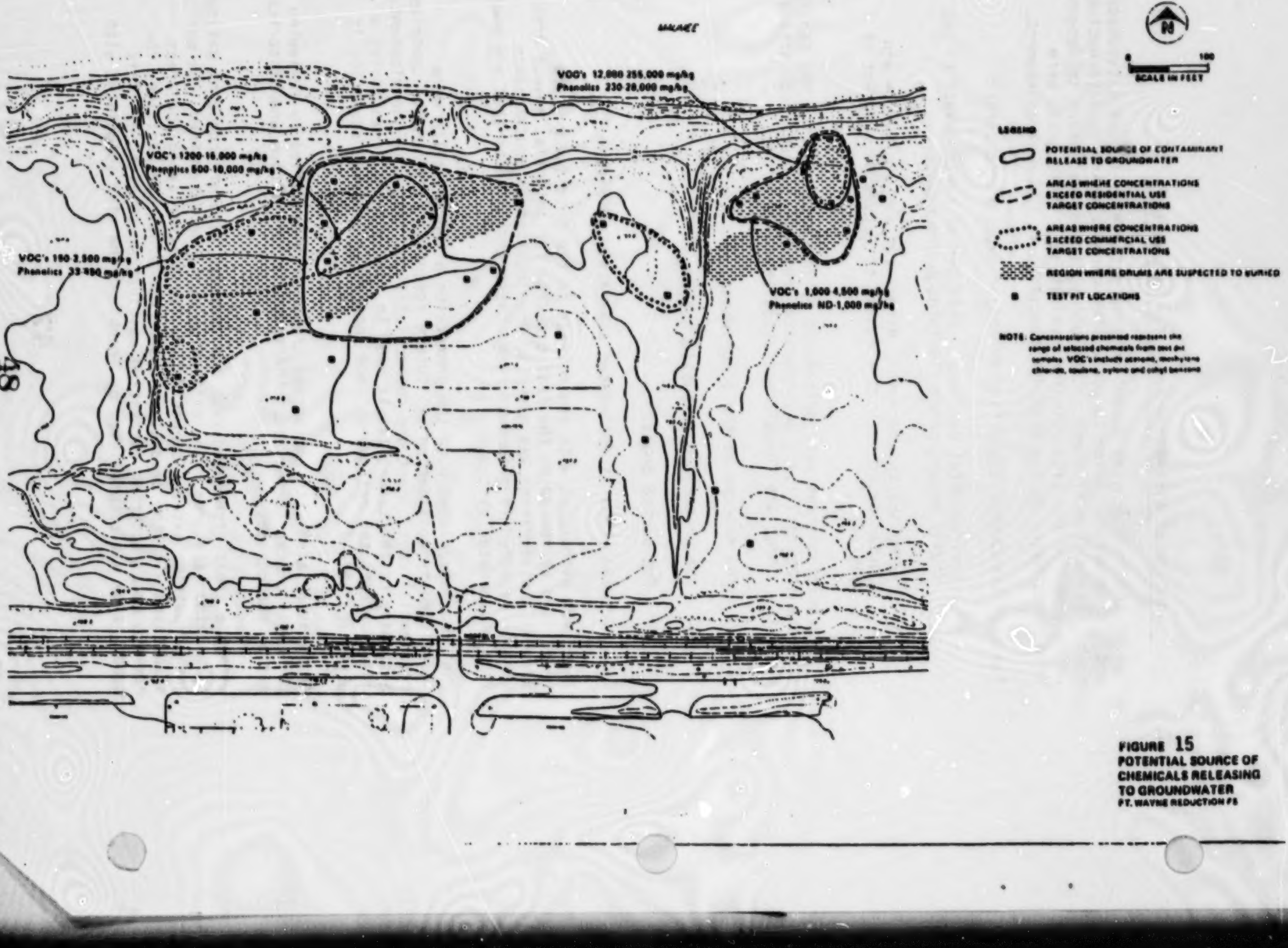
Each of these areas is delineated separately on Figure 15.

The areas associated with the release to the groundwater were identified by reviewing the test pit data for potential source areas. Special consideration was given to the location of contaminants already detected in groundwater and those contaminants that are mobile in a groundwater system.

The areas associated with the protection of human health were identified by considering two future potential development scenarios: residential development and commercial/light industrial development. A summary of the target levels used to identify the areas posing a risk for both the residential and commercial exposure scenarios is given in Table 11.

Areas associated with the buried drums were identified by reviewing the magnetometer survey data, the test pit information and historical aerial photographs.

With the areas associated with the separate exposure concerns defined, the maximum area requiring excavation could be determined. The maximum area requiring excavation was determined by overlaying the areas associated with the separate exposure concerns. In addition, the maximum area requiring excavation was further subdivided. This subdivision was accomplished by "ranking" the risk associated with


MAUMEE
VOC's 12,000-255,000 mg/kg
Phenolics 230-28,000 mg/kg
VOC's 1200-16,000 mg/kg
Phenolics 500-10,000 mg/kg
VOC's 190-2,500 mg/kg
Phenolics 33-850 mg/kg
VOC's 1,000-4,500 mg/kg
Phenolics ND-1,000 mg/kg
N
0
100
SCALE IN FEET
LEGEND
POTENTIAL SOURCE OF CONTAMINANT RELEASE TO GROUNDWATER
AREAS WHERE CONCENTRATIONS EXCEED RESIDENTIAL USE TARGET CONCENTRATIONS
AREAS WHERE CONCENTRATIONS EXCEED COMMERCIAL USE TARGET CONCENTRATIONS
REGION WHERE DRUMS ARE SUSPECTED TO BURIED
TEST PIT LOCATIONS

NOTE: Concentrations presented represent the range of selected chemicals from test pit samples. VOC's include acetone, methylene chloride, toluene, xylene and ethyl benzene

FIGURE 15
POTENTIAL SOURCE OF
CHEMICALS RELEASING
TO GROUNDWATER
FT. WAYNE REDUCTION FS

Table 11
SOIL TARGET CONCENTRATIONS BASED ON SOIL INGESTION

Chemical	Residential Target mg/kg[a]	Commercial Target mg/kg[b]
Acetone	15,000	70,000
Aldrin*	0.041	0.807
Antimony	60	280
Barium	7,500	35,000
Benzene*	13	260
Beryllium	750	3,500
Bis(2-ethylhexyl)phthalate*	1,000	20,000
2-Butanone	7,500	35,000
Cadmium	44	200
Chlorobenzene	4,000	19,000
Chloroform*	8.6	170
Chromium III	150,000	700,000
Chromium VI	750	3,500
Copper	5,600	26,000
Dibutyl phthalate	15,000	70,000
1,1-Dichlorothane	18,000	84,000
1,1-Dichloroethene*	1.2	23
2,4-Dichlorophenol	450	2,100
Diethyl phthalate	2,000,000	91,000,000
Ethylbenzene	15,000	70,000
Isophorone	22,000	100,000
Lead	210	980
Lindane*	0.526	10
Methylene chloride*	93	1,800
Methyl phenol	7,500	35,000
4-Methyl-2-Pentanone	7,500	35,000
Nickel	3,000	14,000
PAHs**	5	5
PCBs	10	10
Pentachlorophenol	4,500	21,000
Phenol	6,000	28,000
Stryene	30,000	140,000
Tetrachloroethene*	140	7,000
Toluene	45,000	210,000
1,1,1-Trichloroethane	14,000	63,000
Trichloroethene*	64	1,200
Xylene	1,500	7,000
Vinyl chloride*	0.3	60
Zinc	32,000	150,000

Note: Target concentrations based on the following:

Noncarcinogenic effects derived from RfD values
* Carcinogenic risk at the 10-6 level derived from cancer potency factors
** Based on background PAH levels
***Based on EPA PBC spill cleanup guidelines

[a] Residential setting assumes exposure through soil ingestion at 0.1 gram/day, 365 days per year, and 70 years of exposure.

[b] Commercial setting assumes exposure through soil ingestion at 0.05 grams/day, 5 days per week, 26 weeks per year, and

various areas within the maximum area requiring excavation: Area A, Area B and Area C. Area A is the center of the former pit area and represents that area posing the most significant risk at the site. Area B includes Area A as well as the center of the general industrial waste area and the area impacted by the former pit area. Area C includes Area A and Area B and represents the maximum area requiring excavation. Area A, Area B and Area C are shown in Figure 16.

VIII. DESCRIPTION OF ALTERNATIVES

A description of the alternatives developed in the FS is presented below.

A. Municipal Landfill

Total Present Worth:	$2,320,000
Construction Cost:	$1,179,000
Present Worth O&M Cost:	$1,141,000

Historical information and the results of the RI indicate the eastern portion of the site was used as a municipal/general refuse type landfill. The endangerment assessment did not indicate the contaminants present in this portion of the site pose a threat through direct contact with surface soils or migration of groundwater to the river. Ensuring proper maintenance of this portion of the site will require some limited action. Long-term groundwater monitoring and a Subtitle D - solid waste landfill closure appears to be the appropriate extent of action needed at this time to ensure:

- o future migration of groundwater to the river will not pose a threat to the river, and
- o adequate cover is present to prevent surface erosion and subsequent direct contact with or wash-off of the wastes into the river.

The components of this alternative include access restrictions, a soil cover, a long-term groundwater monitoring program and the installation of new groundwater monitoring wells around the perimeter of the landfill. The location of the major components are shown in Figure 17.

The municipal landfill closure action described above would be performed in conjunction with the other remedial responses described in Alternatives 2, 3, 4 and 5. The cost of the municipal landfill closure is reflected in the total present worth cost estimates listed for Alternatives 2, 3, 4 and 5.

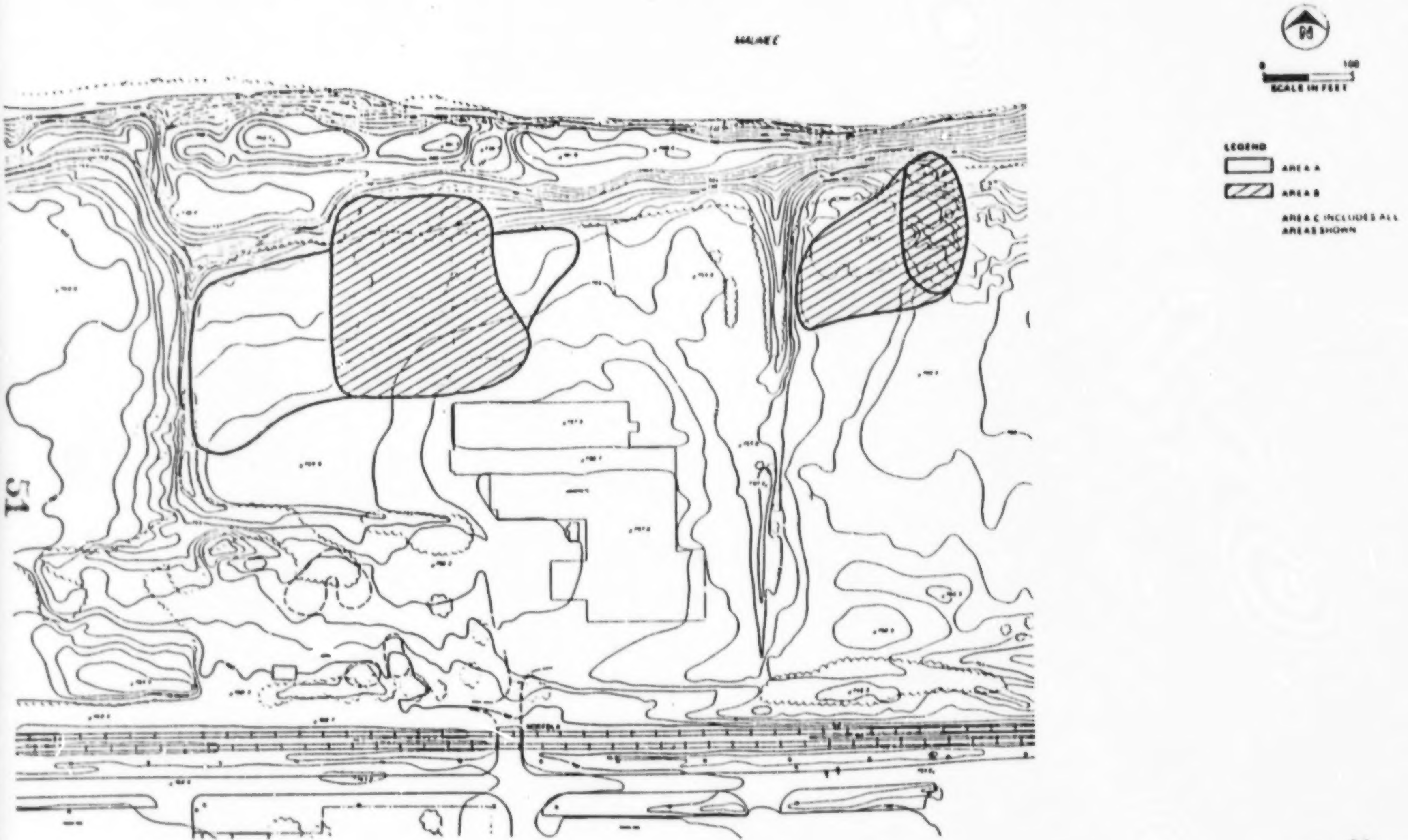

MAUMEE
0
100
SCALE IN FEET
LEGEND
AREA A
AREA B
AREA C INCLUDES ALL
AREAS SHOWN

FIGURE 16
RISK BASED AREAS
OF EXCAVATION
FT WAYNE REDUCTION FS

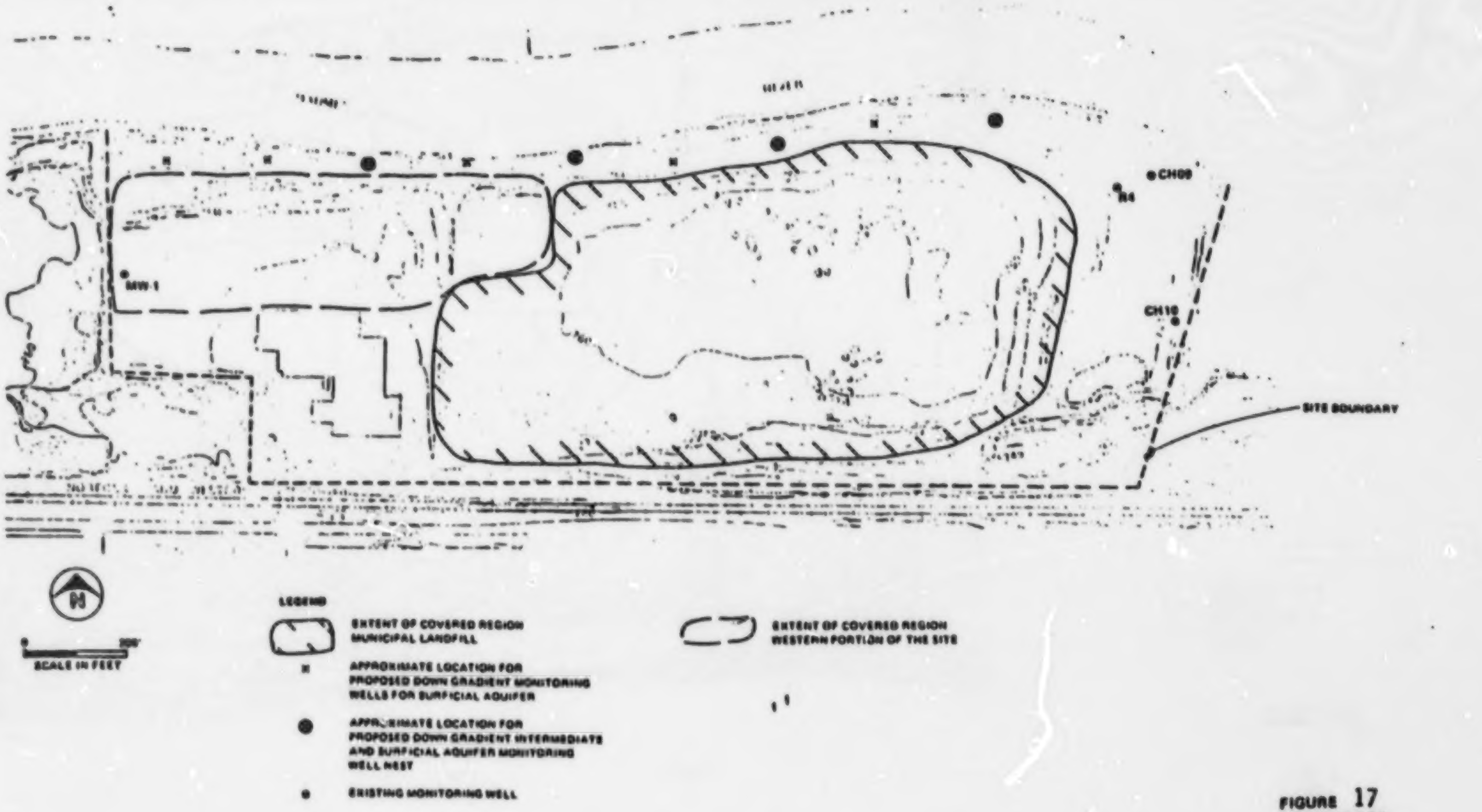

CH09
R4
CH10
MW-1
SITE BOUNDARY
N
0
200'
SCALE IN FEET
LEGEND
EXTENT OF COVERED REGION MUNICIPAL LANDFILL
APPROXIMATE LOCATION FOR PROPOSED DOWN GRADIENT MONITORING WELLS FOR SURFICIAL AQUIFER
APPROXIMATE LOCATION FOR PROPOSED DOWN GRADIENT INTERMEDIATE AND SURFICIAL AQUIFER MONITORING WELL NEST
EXISTING MONITORING WELL
EXTENT OF COVERED REGION WESTERN PORTION OF THE SITE

FIGURE 17
SITE CLOSURE
FT. WAYNE REDUCTION FS

B. Alternative 1 - No Action

Total Present Worth:	$ 0
Time to Implement:	0 months

The NCP requires that the "no action" alternative be considered at every site. Under this alternative, no further action would be taken at the site. All wastes, routes of off-site contaminant migration (i.e., groundwater), and human and environmental exposure pathways would remain unchanged. This alternative would not reduce the threats to human health and/or the environment identified at the site.

C. Alternative 2 - Groundwater Collection and Treatment

Total Present Worth:	$ 4,940,000
Construction Cost:	$ 1,471,000
Present Worth O&M Cost:	$ 1,149,000
Municipal Landfill Closure:	$ 2,320,000
Time to Implement:	14 - 16 months

Alternative 2 includes the following components:

- Access Restrictions

- Groundwater Collection System - The groundwater collection system consists of a collection trench placed hydraulically downgradient of the wastes in the western portion of the site and a vertical barrier placed between the collection trench and the river. Groundwater is intercepted by the trench and subsequently treated. Additional monitoring wells would be installed to monitor the effectiveness of the system.

- Groundwater Treatment - Groundwater treatment can be accomplished by using either an on-site treatment plant or the Publically Owned Treatment Works (POTW). An on-site groundwater treatment plant would utilize a granular activated carbon adsorption technology for the removal of the contaminants. The treated water is monitored to assure compliance with discharge limits and subsequently released to the Maumee River. Two options are available if discharge to the POTW is permitted. The collected groundwater can be discharged directly to the main sewer line adjacent to the site or it can be collected on-site in a holding tank, loaded into a truck and transported to the POTW facility for discharge. Either POTW option requires compliance with the established pretreatment requirements.

- Soil Cover - To reduce exposure to surface and subsurface contaminants, a soil cover would be installed at the completion of the remedial activity. Installation of a soil cover involves clearing and grubbing vegetation from the surface, regrading the surface and placing and compacting a 2 foot layer of locally available soil. The surface is regraded only to the extent that the waste mass is undisturbed. The top 6 inches of cover is topsoil capable of supporting grass vegetation. Final contours are designed to promote surface drainage.
- Municipal Landfill Closure

Figure 18 shows the location of the major components in this alternative.

Construction of the collection trench and vertical barrier should occur between July and October to reduce the threat caused by flooding events. Approximately, 0.3 acre of wetlands will be destroyed by this alternative.

D. Alternative 3 - Containment

Total Present Worth:	$ 5,260,000
Construction Cost:	$ 1,883,000
Present Worth O&M Cost:	$ 1,057,000
Municipal Landfill Closure:	$ 2,320,000
Time to Implement:	16 - 18 months

Alternative 3 includes the following components:

- Access Restrictions
- Groundwater Collection System - This containment alternative builds on Alternative 2 - Groundwater Collection and Treatment by minimizing the inflow of groundwater to the area of buried waste. This is accomplished by installing a vertical barrier around the entire area of buried waste in the western portion of the site. The groundwater collection trench would be installed inside the northern boundary of the barrier. Installation of the collection trench inside the barrier will maintain any groundwater flow through the barrier in an inward direction.
- Groundwater Treatment - Same as described in Alternative 2.
- Soil Cover - Same as described in Alternative 2.
- Municipal Landfill Closure

Figure 19 shows the location of the major components in this alternative.

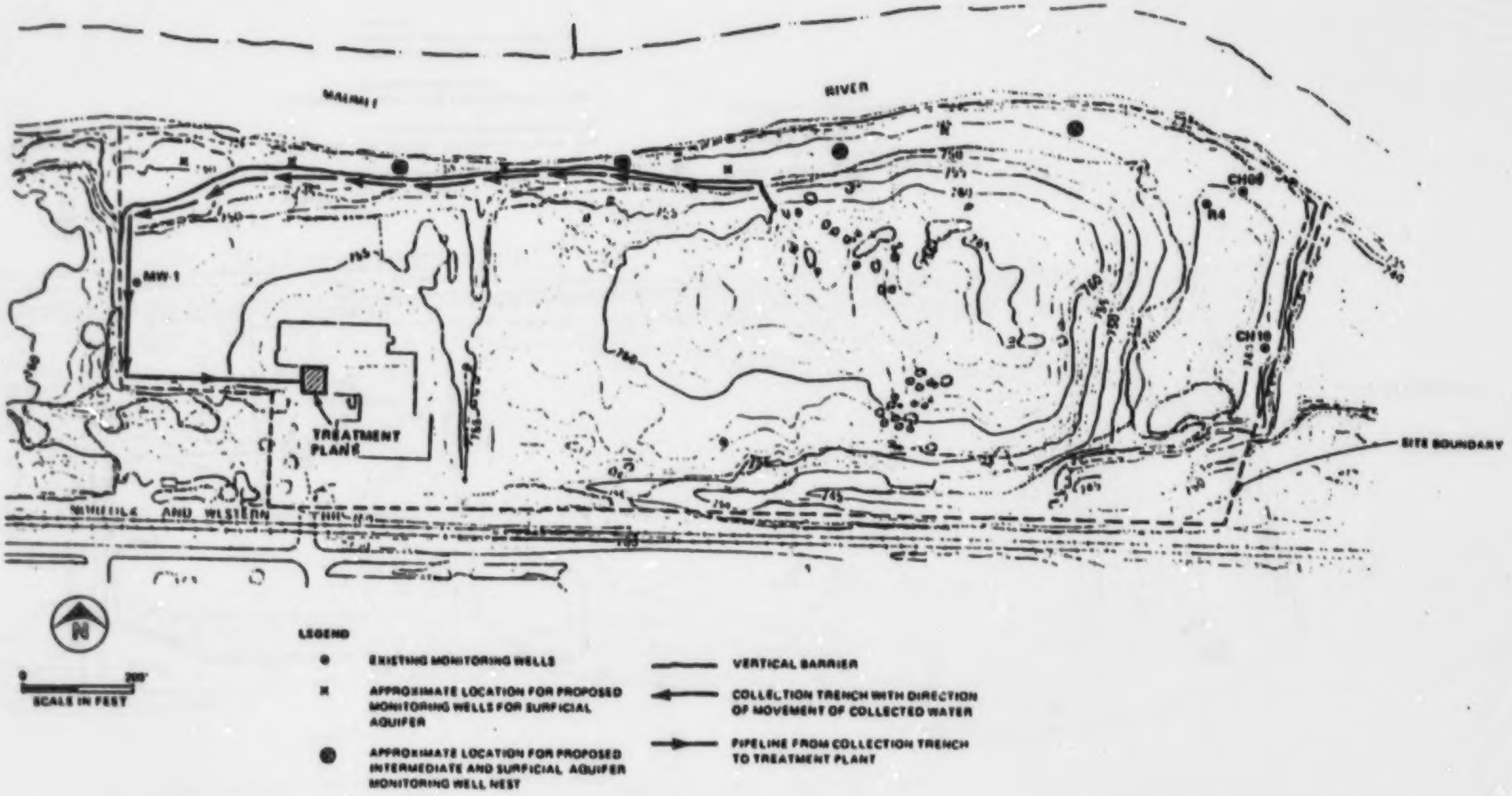

MAUMEE
RIVER
CH08
R4
CH10
SITE BOUNDARY
MW-1
TREATMENT PLANT
NORFOLK AND WESTERN
750
755
760
N
0
200'
SCALE IN FEET
LEGEND
EXISTING MONITORING WELLS
APPROXIMATE LOCATION FOR PROPOSED MONITORING WELLS FOR SURFICIAL AQUIFER
APPROXIMATE LOCATION FOR PROPOSED INTERMEDIATE AND SURFICIAL AQUIFER MONITORING WELL NEST
VERTICAL BARRIER
COLLECTION TRENCH WITH DIRECTION OF MOVEMENT OF COLLECTED WATER
PIPELINE FROM COLLECTION TRENCH TO TREATMENT PLANT

FIGURE 18
GROUNDWATER COLLECTION ALTERNATIVE
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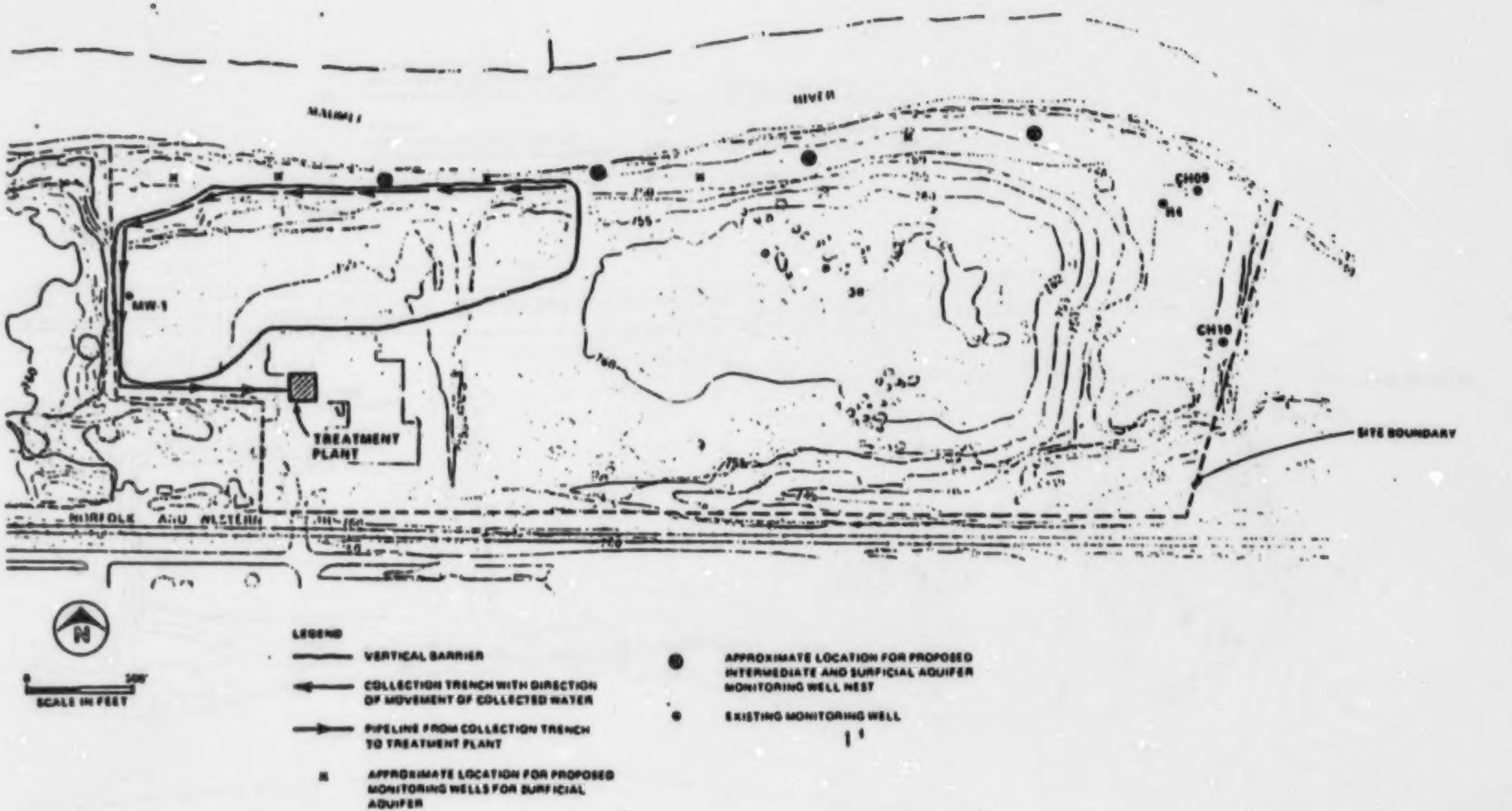
MAUMEE
RIVER
CH09
CH10
MW-1
TREATMENT PLANT
SITE BOUNDARY
NORFOLK AND WESTERN
N
0
500'
SCALE IN FEET
LEGEND
VERTICAL BARRIER
COLLECTION TRENCH WITH DIRECTION OF MOVEMENT OF COLLECTED WATER
PIPELINE FROM COLLECTION TRENCH TO TREATMENT PLANT
APPROXIMATE LOCATION FOR PROPOSED MONITORING WELLS FOR SURFICIAL AQUIFER
APPROXIMATE LOCATION FOR PROPOSED INTERMEDIATE AND SURFICIAL AQUIFER MONITORING WELL NEST
EXISTING MONITORING WELL

FIGURE 19
CONTAINMENT ALTERNATIVE
FT. WAYNE FS

Construction of the collection trench and the northern portion of the vertical barrier should occur between July and October to reduce the threat caused by flooding events. Approximately, 0.1 acre of wetlands will be destroyed by this alternative.

E. Alternative 4 - Soil Excavation for Drum Removal

4A	Total Present Worth:	\$ 5,490,000
	Construction Cost:	\$ 2,027,000
	Present Worth O&M Cost:	\$ 1,143,000
	Municipal Landfill Closure:	\$ 2,320,000
	Time to Implement:	18 - 20 months
4B	Total Present Worth:	\$ 8,030,000
	Construction Cost:	\$ 4,568,000
	Present Worth O&M Cost:	\$ 1,142,000
	Municipal Landfill Closure:	\$ 2,320,000
	Time to Implement:	26 - 28 months
4C	Total Present Worth:	\$ 10,020,000
	Construction Cost:	\$ 6,558,000
	Present Worth O&M Cost:	\$ 1,142,000
	Municipal Landfill Closure:	\$ 2,320,000
	Time to Implement:	28 - 30 months

Alternative 4 includes the following components:

- Access Restrictions
- Groundwater Collection System - Same as described in Alternative 2.
- Groundwater Treatment - Same as described in Alternative 2.
- Excavation to Remove Buried Drums - Excavation is performed using conventional equipment. Wastes and soil are removed until a drum is unearthed, the drum is removed, overpacked and moved to a storage area. The drums would remain on-site until they can be incinerated. Any transportation and/or storage of drums would be in compliance with Department of Transportation (DOT) and Resource Conservation and Recovery Act (RCRA) regulations.

This alternative has three options for excavation and drum removal that correspond to the three previously described risked-based areas of excavation: Area A, Area B and Area C. The estimated number of drums excavated in each option is listed below:

- Alternative 4A - 600 drums
- Alternative 4B - 2,500 drums
- Alternative 4C - 4,600 drums

The unearthed soil and waste is reconsolidated on-site in the excavated areas.

- Soil Cover - Same as described in Alternative 2.
- Municipal Landfill Closure

Figure 20 shows the location of the major components in this alternative.

Most of the areas for drum excavation are above the 10-year flood elevation and are not frequently subjected to flood waters. It is conservatively assumed however, that drum excavation might be limited 3 months out of a year. As in the other alternatives, construction of the collection trench and the vertical barrier should occur between July and October. Approximately, 0.3 acre of wetlands will be destroyed by this alternative.

F. Alternative 5 - Contaminated Soil and Drum Removal/On-site Incineration

5A	Total Present Worth:	$ 13,320,000
	Construction Cost:	$ 9,951,000
	Present Worth O&M Cost:	$ 1,049,000
	Municipal Landfill Closure:	$ 2,320,000
	Time to Implement:	22 - 28 months
5B	Total Present Worth:	$3 6,120,000
	Construction Cost:	$ 32,729,000
	Present Worth O&M Cost:	$ 1,071,000
	Municipal Landfill Closure:	$ 2,320,000
	Time to Implement:	42 - 48 months
5C	Total Present Worth:	$ 47,750,000
	Construction Cost:	$ 44,401,000
	Present Worth O&M Cost:	$ 1,029,000
	Municipal Landfill Closure:	$ 2,320,000
	Time to Implement:	54 - 60 months

Alternative 5 includes the following components:

- Access Restrictions
- Groundwater Collection System - Same as described in Alternative 2.
- Groundwater Treatment - Same as described in Alternative 2.

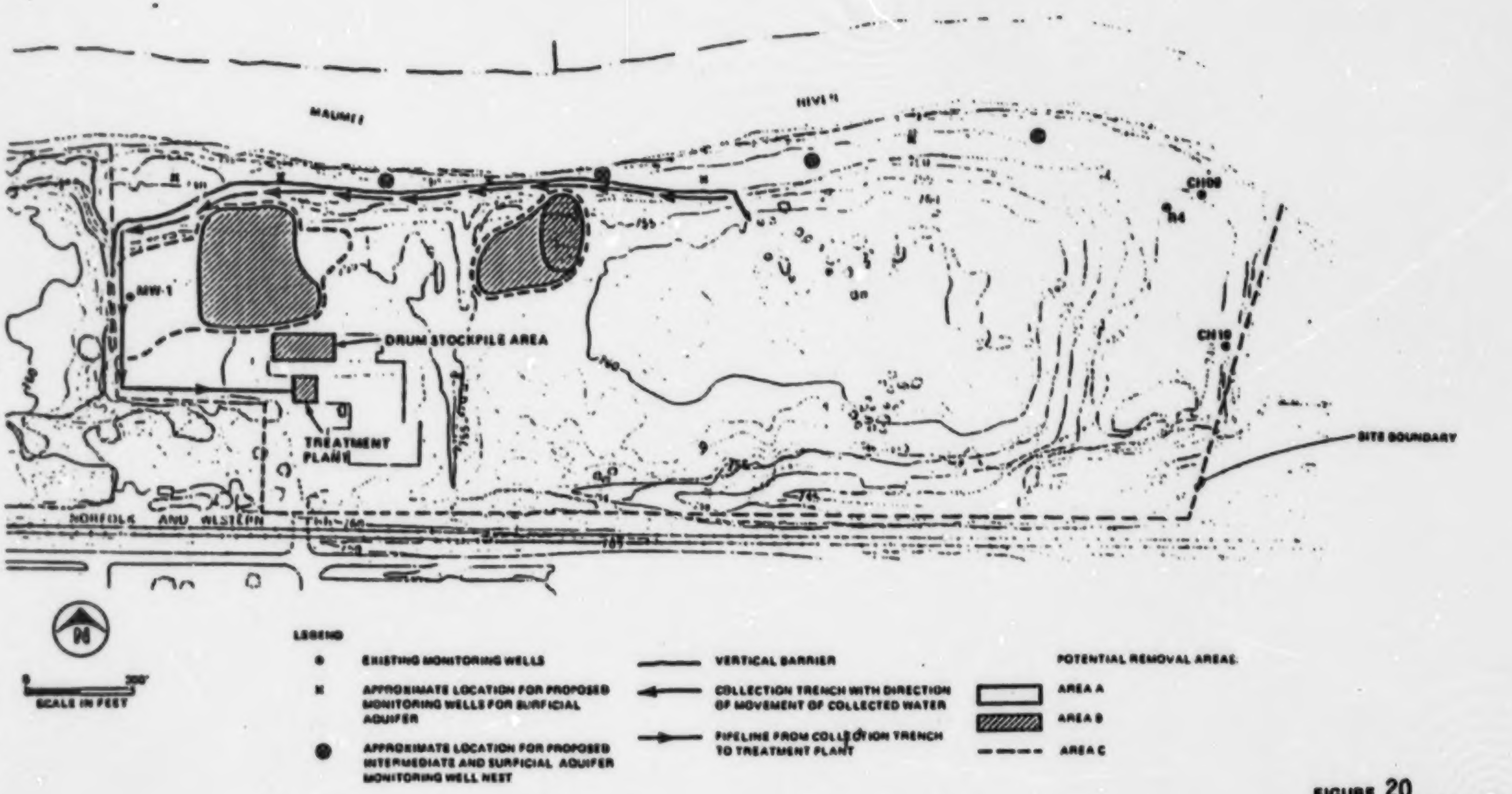
MAUMEE
RIVER
MW-1
DRUM STOCKPILE AREA
TREATMENT PLANT
CH10B
CH10
SITE BOUNDARY
NORFOLK AND WESTERN
N
0
300'
SCALE IN FEET
LEGEND
EXISTING MONITORING WELLS
APPROXIMATE LOCATION FOR PROPOSED MONITORING WELLS FOR SURFICIAL AQUIFER
APPROXIMATE LOCATION FOR PROPOSED INTERMEDIATE AND SURFICIAL AQUIFER MONITORING WELL NEST
VERTICAL BARRIER
COLLECTION TRENCH WITH DIRECTION OF MOVEMENT OF COLLECTED WATER
PIPELINE FROM COLLECTION TRENCH TO TREATMENT PLANT
POTENTIAL REMOVAL AREAS
AREA A
AREA B
AREA C

FIGURE 20
EXCAVATION OF SOIL FOR DRUM REMOVAL AND OFFSITE INCINERATION ALTERNATIVE
FT. WAYNE FS

- Excavation of Soil and Drums for On-site Incineration - A mobile incinerator would be transported and erected on the existing foundation pad at the south end of the site. A storage building is constructed nearby on the north end of the pad. Contaminated soil, waste and buried drums is excavated and hauled to the storage area. The storage area would have a leachate collection system for any free water draining from the soils. In addition the storage area would be completely covered to keep the soils dry for incineration.

  Drums would be staged in a separate secure area. The liquids in the drums would be emptied to a holding tank. The empty drums would be decontaminated and crushed.

  The wastes, soils and drum liquids staged during the excavation would be incinerated in the on-site incinerator. There are three options for soil excavation and drum removal which correspond to the three areas defined under Alternative 4. The estimated volumes of wastes/soils for excavation and incineration are:

  - Alternative 5A - 4,400 yd^3 to incinerate
    6,100 yd^3 to excavate
  - Alternative 5B - 30,000 yd^3 to incinerate
    37,000 yd^3 to excavate
  - Alternative 5C - 43,000 yd^3 to incinerate
    57,000 yd^3 to excavate

  The estimated number of drums removed in each area would be the same as those presented in Alternative 4.

  The incinerator ash and the crushed empty drums would be returned to the excavation area for disposal. The ash and crushed drums would be placed above the expected high water table level.

- Multi-layer Cap - A multi-layer cap would be installed over the area where incinerator ash and crushed drums are returned as backfill. The multi-layer cap should be composed of three distinctive layers:

  - Topsoil and fill layer
  - Drainage layer
  - Barrier layer

  More specifically a soil-clay cap consisting of a clay barrier covered by a sand drainage layer and a fill and topsoil layer would be used for this alternative.

- Municipal Landfill Closure

Figure 21 shows the location of the major components in this alternative.

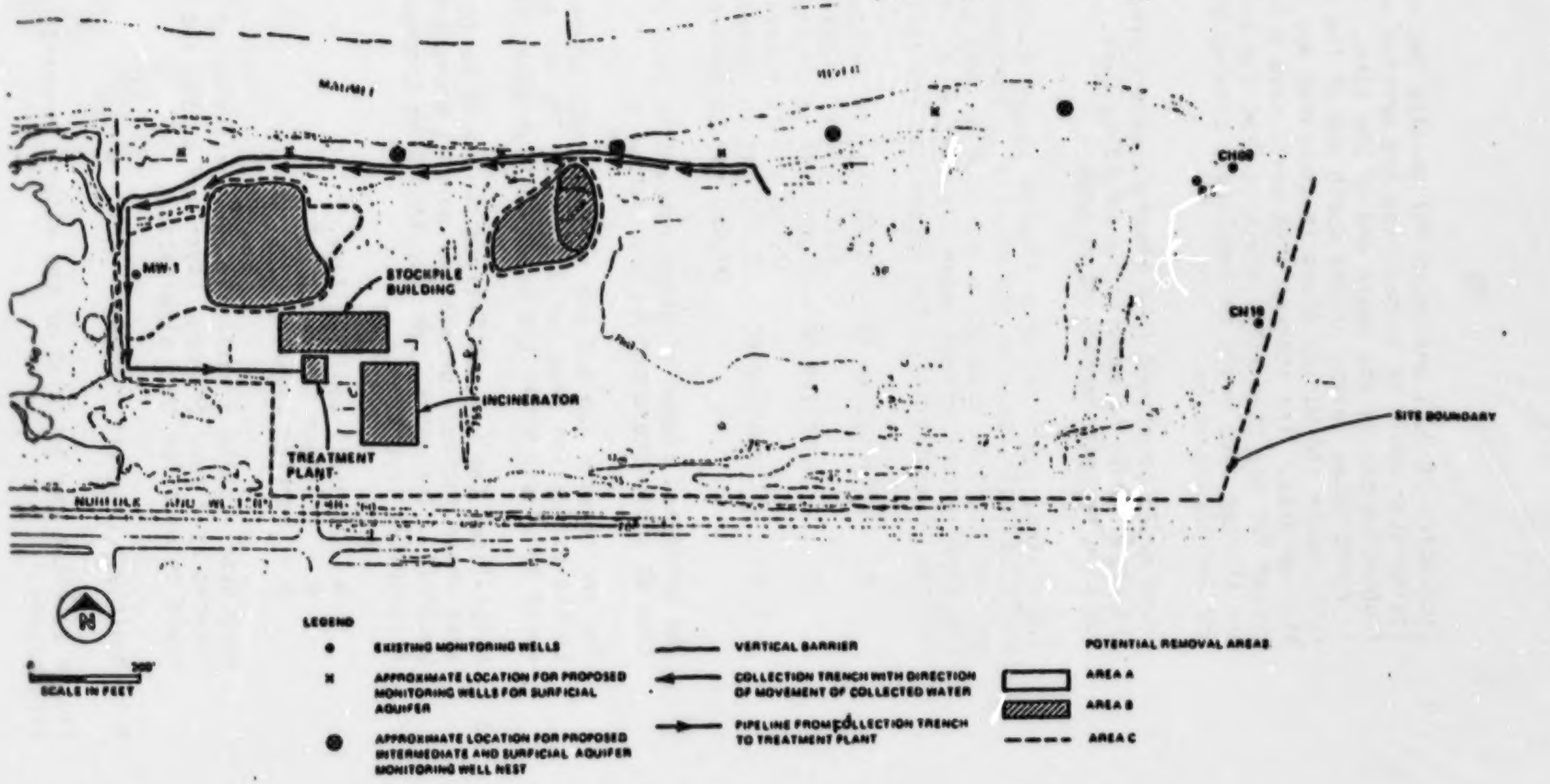
MAUMEE
RIVER
CH06
CH16
MW-1
STOCKPILE BUILDING
INCINERATOR
TREATMENT PLANT
SITE BOUNDARY
N
0
300'
SCALE IN FEET
LEGEND
● EXISTING MONITORING WELLS
× APPROXIMATE LOCATION FOR PROPOSED MONITORING WELLS FOR SURFICIAL AQUIFER
● APPROXIMATE LOCATION FOR PROPOSED INTERMEDIATE AND SURFICIAL AQUIFER MONITORING WELL NEST
VERTICAL BARRIER
COLLECTION TRENCH WITH DIRECTION OF MOVEMENT OF COLLECTED WATER
PIPELINE FROM COLLECTION TRENCH TO TREATMENT PLANT
POTENTIAL REMOVAL AREAS
AREA A
AREA B
AREA C

FIGURE 21
INCINERATION ALTERNATIVE
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As in Alternative 4, the areas for excavation are not frequently subjected to flood waters. Construction of the collection trench and the vertical barrier should occur between July and October. Approximately, 0.3 acre of wetlands will be destroyed by this alternative.

G. Summary of Alternatives

A summary of the major components for each of the five alternatives is presented in Table 12.

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the alternatives was evaluated using a number of evaluation factors. The regulatory basis for these factors comes from the NCP and Section 121 of SARA. Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants as a principal element, are to be preferred over remedial actions not involving such treatment. The off-site transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available."

Section 121 of SARA also requires that the selected remedy be protective of human health and the environment, cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Based on the statutory language and current U.S. EPA guidance, the nine criteria used to evaluate the remedial alternatives listed above were:

1. **Overall Protection of Human Health and the Environment** addresses whether or not the remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with ARARs** addresses whether or not the remedy will meet all of the applicable or relevant and appropriate requirements of other environmental statutes and/or provide grounds for invoking a waiver.

3. **Long-term effectiveness and permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

4. **Reduction of toxicity, mobility, or volume** is the anticipated performance of the treatment technologies a remedy may employ.

Table 12

SUMMARY OF ALTERNATIVES

Alternative 1--No Action

Alternative 2--Groundwater Collection and Treatment

- Fence site
- Access restrictions
- Slurry wall and collection trench (downgradient of wastes)
- Treatment plant
- Soil cover
- Municipal landfill closure

Alternative 3--Containment

- Fence site
- Access restrictions
- Slurry wall and collection trench (encircling wastes)
- Treatment plant
- Soil Cover
- Municipal landfill closure

Alternative 4--Excavate Soil/Drum Removal

- Fence site
- Access restrictions
- Alternative 2
- Excavate soil area for option 4A, 4B, or 4C
- Remove drums and incinerate offsite
- Reconsolidate soil onsite
- Soil Cover
- Municipal landfill closure

Alternative 5--Incineration

- Fence site
- Access restriction
- Alternative 2 (except soil cover)
- Excavate soil and drums base on areas for option 5A, 5B, 5C
- Incinerate soil and drums
- Deposit ash onsite
- Multilayer cap over the entire area for option 5B and 5C; cap only on former pit area for option 5A; soil cover for the remainder of the western portion of the site
- Municipal landfill closure

5. **Short-term effectiveness** involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. **Cost** includes capital and operation and maintenance costs.

8. **Support Agency Acceptance** indicates whether, based on its review of the RI/FS and Proposed Plan, the support agency (IDEM) concurs, opposes, or has no comment on the preferred alternative.

9. **Community Acceptance** indicates the public support of a given remedy. This criteria is discussed in the Responsiveness Summary.

A matrix which summarizes the comparative analysis of alternatives on a criteria by criteria basis is presented in Figure 22.

The following discussion expounds on the information provided in Figure 22.

A. Overall Protection of Human Health and the Environment

All of the alternatives, with the exception of the no action alternative, would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk from the site through treatment, engineering controls or institutional controls. As the no action alternative does not satisfy the remedial action goal to provide adequate protection of human health and the environment, it is not eligible for selection.

Alternatives 2 and 3 accomplish overall protection of human health and the environment through engineering and institutional controls. The primary controls included in Alternative 2 are a groundwater collection system and deed restrictions. Alternative 3 includes the same controls as Alternative 2 in addition to a containment of the wastes (i.e., a slurry wall encircling the waste area). Both of these alternatives would use treatment to manage the collected groundwater.

Alternatives 4(A, B and C) and 5 (A, B and C) accomplish overall protection of human health and the environment through the treatment of wastes in addition to engineering and institutional controls. Both these alternatives include the engineering and institutional controls of Alternative 2. Alternative 4 however, includes incinerating excavated drums containing liquid waste. The amount of drums

EVALUATION CRITERIA AND ANALYSIS FACTORS	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 GROUNDWATER COLLECTION AND TREATMENT	ALTERNATIVE 3 CONTAINMENT	ALTERNATIVE 4 SOIL EXCAVATION FOR DRUM REMOVAL	ALTERNATIVE 5 INCINERATION	MUNICIPAL LANDFILL
SHORT-TERM EFFECTIVENESS						
Protection During the Remedial Action	No action taken	Community • Fence site • Decontamination of vehicles leaving the site • Use of dust and volatile organic suppressants Workers • Health and safety trained • Air monitoring and use of protective gear • Use of safer trench installation technology • Use of sampling plan Environment • Runoff control while trenching and installing slurry wall	Includes components of Alternative 2	• Includes components of Alternative 2 • Overpack excavated drums • Follow DOT and RCRA regulations on transporting hazardous compounds • RCRA approved containment area for drums storage • Site safety and sampling plan for drum testing and handling	• Includes components of Alternative 2 • Air emission control and monitoring from incinerator operations • Incinerator operators health and safety trained for handling hazardous waste and operating equipment	• Fence site • Dust control • Surface run-off control
Time Until Remedial Actions Commence	No action taken	Activities after ROD is signed • Pre-design investigation 4 months • Design 10-12 months • NPDES permit 6-9 months • Potential delays Working in the 100 year flood plain Acquiring NPDES permit	Activities after ROD is signed Same as Alternative 2 Slurry wall and collection trench would be installed first, then the remainder of the containment wall. Construction of slurry wall and trench take 2-3 months.	Activities after ROD is signed same as Alternative 2. Collection trench and treatment plant are functional prior to excavation for drum removal. This takes 14-16 months before excavation begins.	Activities after ROD is signed same as Alternative 2. Collection trench and treatment plant are operational before excavation and incineration begin. Incineration will require a test burn which could result in delays if emission standards are not met.	After ROD is signed design will take 3 months.
Design Complete	No action taken	12-14 months	12-14 months	12-14 months	14-20 months	3 months
Protection Against Principal Threats (End of Construction)	Principal threat from contaminated groundwater releasing to the Maumee River and direct contact threat still present.	After completion of the slurry wall and collection trench which take 2 months protection against contaminant release to the Maumee River is achieved. Installation of the soil cover achieves protection against the direct soil contact threat. Total time for both threats is 4 months.	Protection against groundwater threat is 2 months as in Alternative 2; protection against direct soil contact takes 6 months allowing for completion of the containment wall and soil cover.	Protection against groundwater threat is 2 months as in Alternative 2. Protection against the direct soil contact, 4A is 6 months, 4B 14 months, 4C 18 months until excavation is complete and the cover installed. This time includes the slurry wall installation.	Protection against groundwater threat is 2 months as in Alternative 2. Protection against direct soil contact, 5A 6 months, 5B 20 months, 5C 40 months until incineration is complete and cap installed. This time includes the slurry wall installation.	No threat has been associated with the landfill.
Completion of Remedial Actions From Start of Design	No action taken	Remedial action is complete when the soil cover is applied, 14-16 months, but groundwater collection and treatment will go into the future indefinitely.	Remedial action is complete when the containment wall is installed and the soil cover applied, 16-18 months. Collection of water will go into the future indefinitely.	Remedial action is complete when the drums are removed and the soil cover applied. 4A, 18-20 months; 4B, 26-28 months; 4C, 28-30 months. Groundwater collection and treatment will go into the future indefinitely.	Remedial action is complete when the incinerator is removed from site and the cap applied. 5A, 22-28 months; 5B, 42-48 months; 5C, 54-60 months. The groundwater collection and treatment will go into the future indefinitely for 5A; it may be significantly reduced for 5B and 5C.	Remedial action is complete when the [illegible] cover is installed. 5 months
LONG-TERM EFFECTIVENESS						
Magnitude of Remaining Risk	Source of risk • Presence of buried drums and waste • Contaminated groundwater and groundwater seeps magnitude of risk as defined in the risk assessment	Source of risk • Presence of buried drums and waste • Collection of contaminated groundwater and handling of spent carbon Magnitude of risk dependent upon: • Reliability of slurry wall to maintain a low permeability • Reliability of collection trench to continue collecting groundwater • Enforcement of site restrictions	Source of risk is similar to Alternative 2 except the waste is contained and groundwater diverted so the volume of treated water is reduced and the movement of contaminants in the soil reduced.	Source of risk • Reconsolidated contaminated waste remains buried drums remain in option 4A and 4B. Magnitude of risk depends on: • The percent drum removal 4A = 10%, 4B = 50%, 4C = 100% of estimated drums • Performance of groundwater collection and treatment system.	Source of risk • Buried drums and contaminated soil • Incinerator ash Magnitude of risk depends on: • Option selected. 5A leaves drums, contaminated soil, some ash. 5B removes half the drums and soil but has more ash buried. 5C leaves ash as residue buried on site. • Performance of the groundwater collection and treatment system.	No risk has been associated with the municipal landfill.
Long Term Controls	No long term controls	• Institutional controls of deed restriction and site restriction • Operation and maintenance of groundwater collection system • Groundwater monitoring • Maintenance of soil cover	Same as Alternative 2	Same as Alternative 2.	Same as Alternative 2 except the length of time on deed restriction may change for 5C, and a multi-layer cap is placed where ash is buried.	• Monitoring • Maintenance of soil cover

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FIGURE 22 (PAGE 1 OF 3)
COMPARISON OF ALTERNATIVE
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EVALUATION CRITERIA AND ANALYSIS FACTORS	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 GROUNDWATER COLLECTION AND TREATEMENT	ALTERNATIVE 3 CONTAINMENT	ALTERNATIVE 4 SOIL EXCAVATION FOR DRUM REMOVAL	ALTERNATIVE 5 INCINERATION	MUNICIPAL LANDFILL
REDUCTION OF TOXICITY MOBILITY AND VOLUME						
Treatment Process and Remedy	No treatment performed	Granular activated carbon to treat contaminated ground water, no special requirements, does not address the principal threat of direct contact with the buried waste.	Treatment is the same as Alternative 2.	• Includes Alternative 2 treatment • Offsite incineration of drums addresses part of the direct contact threat with buried waste, limited offsite incineration capacity	• Includes Alternative 2 treatment • Incineration of soil and drums • Precipitation of scrubber water and sludge disposal • Addresses principal threats, is difficult to implement and has many special technical considerations such as limited operating data, equipment availability, residual ash and sludge require special handling	No treatment
Amount of Hazardous Material Treated and Residual From Treatment	None	• 2.5 million gallons a year groundwater • 5800 lbs. year carbon regenerated • Contaminants removed 400 pounds a year	• 0.4 million gallons a year groundwater • 3400 lbs. year carbon regenerated • Contaminants removed 70 pounds a year	• 2.5 million gallons groundwater a year • Contaminants removed 400 pounds a year • 5800 lbs. year carbon regeneration • Drummed liquid incineration 4A 30,000 gallons 4B 125,000 gallons 4C 230,000 gallons	• Groundwater flow 5A, B, C 2.5 million gallons year • Carbon regeneration 5A = 3140 lbs year, 5B, C = 410 lbs year • Contaminants removed 5A = 60 lbs a year 5B, C is negligible • Soil treated 5A, 4,400 cy, 5B, 31,000 cy, 5C, 43,000 cy • Drummed liquids same as Alternative 4 • Ash remaining 5A = 3,700 cy 5B = 26,000 cy 5C = 37,000 cy	None
Reduction of Toxicity Mobility and Volume	No reduction of toxicity, mobility and volume	There is no reduction of toxicity, mobility or volume in the soil contaminants other than that which occurs over time through the flushing action of the groundwater moving through the saturated zone.	Although the waste is contained there is little reduction of toxicity, mobility or volume of the source contaminants. To a slightly greater degree than Alternative 2, some reduction is achieved by the collection of the small volume of water infiltrations into the contained area.	Drum removal provides little or no reduction to the toxicity and volume of contaminated waste. The remaining contaminants in the soil are still mobile.	The reduction in contaminated soil and drummed liquid mass, volume and toxicity is traded against the additional mass of ash disposed on site that can potentially be toxic and has limited mobility of inorganic compounds.	None
Is Treatment Reversible?		Carbon absorption, yes. Carbon regeneration, no.	Carbon absorption, yes. Carbon regeneration, no.	Incineration, no. Carbon absorption, yes.	Incineration, no. Precipitation, yes.	
IMPLEMENTABILITY						
Technical Feasibility	Does not apply	• Soil cover and groundwater treatment options are simple to construct, implement and maintain. Slurry wall and trench are constructed in unknown waste material that could require removal prior to installing the wall or laying the trench. • New trench technology although feasible is difficult to predict scheduling or long term performance. • Long term slurry wall performance is not known but to date other installations have performed well. • Construction in the 100 year flood plain and in the wetlands can cause schedule delays and require administrative controls. • Schedule delays can come from working in different levels of protection. • Future remedial action could be the remedial actions proposed in Alternative 3, 4 or 5.	Technical feasibility includes Alternative 2 plus excavation through buried waste to install the slurry wall has the unknown factor of how much additional work slow down is involved in sorting through the waste to build the wall. Future remedial actions could be Alternative 4 or 5.	Technical feasibility includes Alternative 2 • Excavation is simple and straightforward technology but the delays come from working in different levels of protection and sorting through the buried drums and debris. • Drums may have to be stockpiled until incineration capacity becomes available. • Future remedial actions depend on which option is selected. Alternative 5 can be done at a later date.	Technical feasibility includes Alternative 2, 4 • Scheduling excavation and incineration are important criteria. • Excavating in the saturated zone is difficult. • Incineration of contaminated soil is proven technology but there is still limited information and data available to design, operate and schedule the process. Can be a high risk if all factors are not considered. • If 5A is selected, then future remedial actions may involve 5B and 5C.	Soil cover and monitoring are [illegible] to implement and maintain. No future remedial action is anticipated

FIGURE 22 (PAGE 2 OF 3)
COMPARISON OF ALTERNATIVES
FT. WAYNE REDUCTION FS

EVALUATION CRITERIA AND ANALYSIS FACTORS	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 GROUNDWATER COLLECTION AND TREATMENT	ALTERNATIVE 3 CONTAINMENT	ALTERNATIVE 4 SOIL EXCAVATION FOR DRUM REMOVAL	ALTERNATIVE 5 INCINERATION	MUNICIPAL LANDFILL
IMPLEMENTABILITY						
Availability of Services and Materials	Does not apply	• All materials are available • Slurry wall and trench contractors are specialized and may require additional mobilization time • Skid mounted GAC units widely available, vendor will regenerate the carbon as part of the contract.	Components are the same as Alternative 2	• Alternative 2 is included • Sufficient storage area exists on site to stockpile drums and soil during excavation • Offsite incineration capacity is limited • No special requirement for the excavation contractor	• Alternative 2 is included for the groundwater collection system • Incinerator contractors with experience are limited and scheduling could be a concern • Adequate storage capacity for excavated soil is not available so incineration and excavation must be closely scheduled with mobilization for the excavation.	All services and materials are available
Administrative Feasibility	The site remains at the same status	Coordination with other agencies is required for these areas: • NPDES discharge limits required • COE approval of flood proofing site • Potential wetlands mitigation • Deed restrictions • Site closure	Same level of effort is required as in Alternative 2	Same level of effort is required as in Alternative 2 including the shipping and handling of the drums for incineration. This requires coordination with DOT and RCRA	More coordination is required than Alternative 2-4 because of the additional need for trial burns and to meet the substantive requirements for air emissions from incineration	Coordination for landfill closure
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT						
Compliance With ARAR's	No	Yes	Yes	Yes	Yes	Yes
Reduction of Existing and Future Risk	No reduction of risk, future risk exist if drums rupture or if potentially contaminated groundwater reaches the existing wells.	Risk from direct release of contaminated groundwater to the Maumee River and direct human contact of groundwater and surface and subsurface soils achieved. Future risk is controlled by operation and maintenance of the groundwater collection and treatment system, soil cover and fence and enforcing the deed restrictions.	Includes all the components of Alternative 2 plus containment of the waste reduces the volume of contaminated groundwater to be collected and treated.	Includes all of the components of Alternative 2 plus the reduction of the volume of buried waste.	Includes all of the components of Alternative 2 plus the maximum reduction in the volume of contaminated waste but deposits a incinerator ash on site which presents a potential risk of elevated inorganic concentration in the soil.	No immediate risk present at the site. Does provide for stabilization of the landfill in the 100 year flood plain.
Overall Protection	No protection provided.	Protection of human health and the environment substantial but it requires enforcement of the site controls.	Protection of human health and the environment substantial but it requires enforcement of the site controls.	Protection of human health and the environment substantial but it requires enforcement of the site controls.	Protection of human health and the environment substantial but it requires enforcement of the site controls.	Protection from washout of the landfill during flooding achieved.
COST SUMMARY						
Total Capital Cost		1,470,000	1,580,000	4A 2,830,070 4B 4,570,000 4C 6,560,000	5A 9,950,000 5B 30,730,000 5C 44,460,000	1,120,000
Operation and Maintenance		1,140,000	1,080,000	4A 1,140,000 4B 1,140,000 4C 1,140,000	5A 1,050,000 5B 1,030,000 5C 1,030,000	1,140,000
Total Present Worth at 5%		2,620,000	2,940,000	4A 3,170,000 4B 5,710,000 4C 7,700,000	5A 11,000,000 5B 33,000,000 5C 45,430,000	2,320,000
Total Remedial Action With Landfill Closure	Does not apply	4,040,000	6,260,000	4A 5,460,000 4B 8,030,000 4C 10,030,000	5A 13,330,000 5B 36,120,000 5C 47,750,000	2,220,000

FIGURE 22 (PAGE 3 OF 3)
COMPARISON OF ALTERNATIVE
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excavated and liquids incinerated is dependent on the risk-based area (A, B or C) selected. Alternative 5 includes incinerating the excavated drums containing liquid wastes and soils/wastes. The amount of drums excavated and liquids and soils/wastes incinerated is also dependent on the risk-based area (A, B or C) selected.

B. Compliance with ARARs

All of the alternatives, except for the no action alternative, would meet all applicable or relevant and appropriate requirements of Federal and State environmental laws. Table 13 indicates the applicable or relevant and appropriate requirements for each of these alternatives.

C. Long-term Effectiveness and Permanence

Alternatives 2 and 3 employ solely containment type technologies and all the buried drums and wastes would remain in place undisturbed.

Alternative 4C would remove 4,600 buried drums containing liquids which serve as the primary source of contaminant releases to subsurface soils and groundwater. Alternative 4A and 4B would remove 600 and 2,500 drums respectively. The number of drums removed in Alternative 4C represents 100% of the drums anticipated to be present. Alternatives 4A and 4B would remove 13% and 54% of the total number of drums anticipated to be present, respectively. In all of these alternatives, the contaminated subsurface soils and wastes would be reconsolidated on-site and the liquid drum contents incinerated.

Alternative 5A would treat a relatively small volume of contaminated soil, approximately 4,400 yd^3, and 600 drums. This represents 13% of the total number of drums anticipated to be present and 10% of the contaminated subsurface soils and wastes above target level concentrations. Alternatives 5B and 5C would increase: the volume of contaminated soil that is treated to approximately 31,000 yd^3 and 45,000 yd^3 respectively and the number of drums excavated to 2,500 and 4,600 respectively. Alternative 5B treats 69% of the contaminated soils/wastes above target levels and 54% of the total number of drums anticipated to be present. In all of these alternatives the soils/wastes and liquid drum contents are incinerated and the residual ash disposed on-site.

All the alternatives (2, 3, 4 and 5) require long-term maintenance be performed at the site. The long-term risks associated with exposure to, and migration of, the remaining wastes will be reduced by ensuring the following long-term activities are performed:

Table 13 (Page 1 of 4)

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Law, Regulation, Policy, and Standard	Application	Alternative 1	2	3	4	5
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA						
40 CFR 261: Definition and identification	Definition and identification of waste material as hazardous				X	
40 CFR 262: Standards for generators of hazardous waste	Generator requirements include identification of waste generation activity, obtaining EPA ID number, record keeping, and use of uniform national manifest				X	
40 CFR 263: Standards for transport of hazardous waste	The transport of hazardous waste is subject to requirements including DOT regulations, manifesting, record keeping, and discharge cleanup				X	
40 CFR 264: Standards for treatment of hazardous waste	Incineration requirements				X	X
40 CFR 264: Standards for disposal of hazardous waste	Closure requirements (western portion of the site):					
	- Hybrid closure (under CERCLA)		X	X	X	
	- Landfill closure without minimum technology requirements					X
40 CFR 268: Land disposal restriction	Excavated waste disposed onsite may be subject to land disposal restrictions if placement occurs.					X
40 CFR 257: Standards for disposal of solid waste	Closure requirements (eastern portion of the site)		X	X	X	X
40 CFR 264, Subpart I Containers	Storage requirements for containers				X	X
CLEAN WATER ACT (CWA)						
40 CFR 122, 125: National Pollutant Discharge Elimination Systems (NPDES)	Discharges of extracted/treated groundwater will be subject to substantive requirements of the NPDES process if discharged to the Maumee River. NPDES is administered by the state		X	X	X	X

Table 13 (Page 2 of 4)

Law, Regulation, Policy, and Standard	Application	Alternative 1	2	3	4	5
40 CFR 403: Effluent Guidelines and Standards: Pretreatment Standards	Discharges of extracted/treated groundwater will be subject to pretreatment requirements if discharged to the POTW		X	X	X	X
40 CFR 230: Dredge and Fill Requirements	Actions in a wetland or floodplain		X	X	X	X
Ambient Water Quality Criteria	AWQC may be used for discharge requirements where there are no state water quality standards		X	X	X	X
CAA Section 109 and 40 CFR 50: National Ambient Air Quality Standards	Preconstruction review of incineration					X
	NAAQS for PM10 applied to fugitive dust		X	X	X	X
Occupational Safety and Health Act						
29 CFR 1910: General standards for work protection	Worker safety for construction and operation of remedial action		X	X	X	X
29 CFR 1910: Regulations for workers involved in hazardous waste operations	Worker safety for construction and operation of remedial action		X	X	X	X
Hazardous Materials Transportation Act						
49 CFR 100 through 199: Transportation of hazardous material	The transport of hazardous waste is subject to DOT requirements				X	
INTERGOVERNMENTAL REVIEW OF FEDERAL PROGRAMS EXECUTIVE ORDER 12372						
40 CFR 29	State and local coordination and review of proposed EPA assisted projects	X	X	X	X	X

Table 13 (Page 3 of 4)

Law, Regulation, Policy, and Standard	Application	Alternative				
		1	2	3	4	5
Fish and Wildlife Coordination Act						
	Protection of fish and wildlife when federal actions result in the control or modification of a natural stream or body of water	X	X	X	X	X
Endangered Species Act						
Section 7(c)	Consultation with the fish and wildlife service if action may impact endangered species or critical habitat		X	X	X	X
Executive Orders for Flood Plains (EO 11988)						
40 CFR Part 6, Subpart A	Protection of flood plains affected by remedial action		X	X	X	X
Executive Orders for Wetlands (EO 11990)	Protection of wetlands affected by remedial action		X	X	X	X
INDIANA REQUIREMENTS						
Indiana Hazardous Waste Management						
Article 4 (320-IAC-4): - Waste generation identification, standards for generators					X	
- Standards applicable to owners and operators of hazardous waste facilities	Standards for incineration					X
- Closure/post-closure	Closure of the western portion of the site: - Hybred closure (under CERCLA)		X	X	X	
	- Landfill closure					X
Solid Waste Management Permits 330 IAC 5	Closure of eastern portion of the site		X	X	X	X
Indiana Waste Treatment Facilities Regulation						
Article 3.1 (330-IAC) Facility Construction	Construction of onsite treatment plant		X	X	X	X

Table 13 (Page 4 of 4)

Law, Regulation, Policy, and Standard	Application	Alternative 1	2	3	4	5
Indiana Waste Treatment Facilities Regulation						
Article 3.1 (330-IAC) Facility Construction	Construction of onsite treatment plant		X	X	X	X
Indiana Water Pollution Control Board						
Article 5 Industrial Pretreatment and NPDES Programs: - Rules 1 through 10 NPDES Permit	Discharges of extracted/treated groundwater will be subject to substantive requirements of the NPDES process if discharged to the Maumee River. NPDES is administered by the state		X	X	X	X
- Rules 11 through 15 Pretreatment Standards	Discharges of extracted/treated groundwater will be subject to pretreatment requirements if discharged to the POTW		X	X	X	X
Indiana Water Quality Standards						
330 IAC 1-1 Current Standards	Can be used to set discharge goals		X	X	X	X
327 IAC 2-1 Proposed Standards	Can be used to set discharge goals		X	X	X	X

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- Implementation of institutional controls (i.e., deed restrictions and access restrictions).
- Operation and maintenance of the groundwater collection system.
- Maintenance of the soil cover/cap.
- Groundwater monitoring.

D. Reduction of Toxicity, Mobility or Volume

Alternatives 2 and 3 would provide a reduction in groundwater contaminants by 400 lbs per year and 70 lbs per year respectively, but not in the toxicity, mobility or volume of the soil and drum contaminants.

Alternative 4C will provide a reduction in the volume and toxicity of the wastes at the site, with 400 lbs of contaminants removed from groundwater a year and 230,000 gallons of drum liquids incinerated. Alternatives 4A and 4B will also reduce the volume and toxicity of the wastes at the site with 400 lbs of contaminants removed from groundwater a year and 30,000 gallons and 125,000 gallons, respectively, of drum liquids incinerated. All of these alternatives provide for the reconsolidation of excavated soils/wastes on-site. The contaminants remaining in the soils/wastes will still be mobile.

Alternatives 5A, 5B and 5C provide in varying degrees a reduction in the contaminated soils/wastes and drummed liquids at the site. Alternative 5A would incinerate 4,400 yd^3 of soils/wastes and 30,000 gallons of drummed liquid waste. Alternative 5B would incinerate 31,000 yd^3 of soils/wastes and 125,000 gallons of drummed liquid wastes. Alternative 5C would incinerate 45,000 yd^3 of soils/wastes and 230,000 gallons of drummed liquid waste. All of these alternatives provide for the disposal of the residual ash on-site. The reduction achieved in the contaminated soils/wastes and drummed liquid mass, volume and toxicity is traded against the additional mass of the potentially toxic, but less mobile, residual ash disposed on-site. Alternatives 5A, 5B and 5C will have 3,700 yd^3, 26,000 yd^3 and 37,800 yd^3 of residual ash remaining after incineration, respectively. Therefore, incineration of the soils/wastes is only providing a 10% to 16% reduction in the volume of contaminated soils/wastes.

E. Short-term Effectiveness

All of the alternatives (2, 3, 4, and 5) will present a short-term threat to workers, the community and the environment during the construction phase of the remedial action. The implementation of various protective measures (i.e., dust suppressants, air monitoring, runoff control, etc.) during the construction phase will minimize these threats. Alternatives 4 and 5 would require a larger number of

Alternative 4 involves the excavation of soils/wastes while Alternative 5 involves an excavation of soils/wastes as well as an on-site incinerator.

Alternatives 2, 3 and 4A will take relatively the same amount of time to implement (14 to 20 months). Alternatives 4B, 4C and 5A will take a little longer (26 to 30 months). Alternatives 5B and 5C will however involve a significantly longer time frame to implement than any of the other alternatives (42 to 60 months).

Each alternative will achieve protection against the principal threat of groundwater contamination. Alternatives 4 (A, B & C) and 5 (A, B & C) in addition to achieving protection against the principal threat will in varying degrees minimize the major sources (drums containing liquids and contaminated soils/wastes) contributing to the principal threat.

F. Implementability

All of the alternatives (2, 3, 4 and 5) are technically feasible. Some consideration should be given however, to the following items in each alternative:

- Alternative 2
  - Soil cover and groundwater treatment system are simple to construct, implement and maintain.
  - New trench technology although feasible is difficult to predict scheduling or long-term performance.
  - Long-term slurry wall performance is not known but to date other installations have performed well.
  - Construction in the 100 year floodplain and in the wetlands can cause schedule delays and require administrative controls.
  - Schedule delays can come from working in different levels of protection.
- Alternative 3
  - Includes the items listed for Alternative 2.
  - Excavation through buried waste to install the slurry wall has the unknown factor of how much additional work slow down is involved in sorting through the waste to build the wall.

- Alternative 4 (A, B and C)
    - Includes the items listed for Alternative 2.
    - Excavation is a simple and straightforward technology. Delays may be encountered from working in different levels of protection and having to sort through the buried drums and debris.
    - Drums may have to be stockpiled until incineration capacity becomes available.
- Alternative 5 (A, B and C)
    - Includes the items listed for Alternatives 2 and 4.
    - Scheduling excavation and incineration are important criteria.
    - Excavating in the saturated zone is difficult.
    - Incineration of contaminated soil is a proven technology but there is still limited information and data available to design, operate and schedule the process. Can be a high risk if all factors are not considered.

In addition, each of the alternatives has the following administrative difficulties:

- Obtaining NPDES permit limits
- Obtaining various approvals for the flood protection strategy
- Obtaining deed restrictions

6. Cost

For each alternative, the total remedial costs (capital plus operation and maintenance) including the municipal landfill closure in present net worth are:

o	Alternative 1	$ 0
o	Alternative 2	$ 4,940,000
o	Alternative 3	$ 5,260,000
o	Alternative 4A	$ 5,490,000
	4B	$ 8,030,000
	4C	$ 10,020,000
o	Alternative 5A	$ 13,320,000
	5B	$ 36,120,000
	5C	$ 47,750,000

For all of the alternatives, the municipal landfill closure cost (capital and operation and maintenance) is $ 2,320,000 of the total remedial costs. In addition, the operation and maintenance costs for all the alternatives are comparable ($ 1,029,000 to $ 1,149,000 of the total remedial costs). Therefore, the primary difference between the alternatives is the capital costs associated with each alternative. Alternatives 2, 3 and 4A have comparable capital costs ($ 1,471,000, $ 1,883,000 and $ 2,027,000 respectively). The capital costs for Alternatives 4B and 4C are slightly higher ($ 4,568,000 and $ 6,558,000 respectively) than the capital costs for Alternatives 2, 3 and 4A. Alternative 5A provides a slight increase in capital costs ($ 9,951,000) but Alternatives 5B and 5C provide a significant increase in capital costs ($ 32,729,000 and $ 44,401,000, respectively) when compared to the other alternatives.

H. State Acceptance

The State of Indiana supports Alternative 4C - Soil Excavation for Drum Removal. The State of Indiana recognizes the 10% cost share and operation and maintenance responsibilities associated with this alternative, if the remedial action is a fund lead action.

I. Community Acceptance

Community Acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the RI, FS and Proposed Plan, and U.S. EPA's responses to the comments received.

X. THE SELECTED REMEDY

The selected remedy for the Fort Wayne Reduction Site is Alternative 4C - Soil Excavation for Drum Removal. This alternative is protective of human health and the environment, attains applicable or relevant and appropriate requirements promulgated under Federal and State environmental laws, and is cost-effective. Treatment which permanently and significantly reduces the volume, toxicity, and mobility of hazardous substances is a principal element of the remedy. Finally, this alternative utilizes permanent solutions to the maximum extent practicable, and represents the best balance of the factors for selecting an appropriate remedy at the site.

A. Municipal Landfill

The primary components for the remedy on the municipal landfill are access restrictions (fencing and deed restrictions), a soil cover designed for flood protection and a long-term groundwater monitoring program. A soil cover compliant with Subtitle D - solid waste landfill closure requirements is the appropriate extent of remedy for this portion of the site. Historical information and the results of the RI indicate this portion of the site was used as a municipal/general refuse type landfill with little hazardous type materials being disposed. The risk assessment indicated that this portion of the site does not currently pose a threat through direct contact with surface soils. A part of the municipal landfill area is however subjected to flood events. The resulting surface erosion could expose wastes in this area creating a potential direct contact threat or a wash-off of wastes into the Maumee River. Installing and maintaining the soil cover will prevent surface erosion and ensure protection of human health (of on-site trespassers) and the Maumee River.

The risk assessment also indicated that the contaminants migrating through groundwater to the Maumee River do not pose a threat to the river. Ensuring future migration of groundwater does not pose a threat to the river requires implementation of a long-term groundwater monitoring program. The groundwater monitoring program will ensure protection of the Maumee River through the use of alternative concentration limits (ACLs) as a groundwater performance standard.

The criteria established in SARA Section 121(d)(2)(B)(ii) for the application of ACLs stipulates that the following conditions be met at the site:

- There are known and projected points of entry of contaminated groundwater into surface water.
- There is no statistically significant increase of hazardous constituents from ground water into surface water at the point of entry or where there is reason to believe downgradient accumulation may occur.
- The remedial action includes enforceable measures to preclude human exposure between the facility boundary and points of entry into the surface water.

All three of these conditions are met for the eastern portion of the Fort Wayne Reduction site. Direct exposure to any contaminated water on-site will be precluded through the use of deed restriction prohibiting the use of groundwater on-site. The site's property boundary is the discharge point to the Maumee River.

Conceptually, establishment of groundwater protection standards to protect the Maumee River can be based on the following two criteria:

- No statistically significant increase in contamination released to surface water will occur due to discharges from groundwater at the site; and
- No statistically significant exceedance of a State of Indiana Water Quality Standard for surface water will be allowed as a result of the groundwater discharge.

The first criterion will be applied at the Fort Wayne Reduction site. As the site presently exists, satisfying the first criteria will more than satisfy the second requirement. Taking this approach will provide a high degree of protectiveness for the Maumee River.

The mechanics of the groundwater monitoring program will be specifically addressed in the remedial design (RD) phase of the project. However, the basic groundwork for establishing an effective monitoring program is described in the following discussion.

Initially, baseline groundwater quality levels will be developed to better quantify present site contamination. The frequency, timing, and protocol will be developed in a Quality Assurance Project Plan (QAPP) with the objective of gathering representative data of groundwater quality and its variation over a year's period. A statistical test which accounts for the variation of the data will be employed to measure compliance, and should be equivalent to or the same as the "Cochran's Approximation to the Behrens-Fisher Student's t-test". This test will be workable only if the approved sampling protocol and analysis are strictly adhered to.

After baseline groundwater quality is determined and its statistic is derived, subsequent compliance monitoring can be compressed to the baseline statistic. For the subsequent monitoring events a new statistic should be developed and compared to the baseline statistic. If the new statistic exceeds the baseline statistic at the 95% confidence limit there is high probability that a statistically significant increase of a parameter(s) has occurred.

If any exceedance occurs which is statistically significant at the 95% confidence limit, confirmation sampling and analysis should occur. If subsequent sampling confirms a statistically significant increase in the concentrations of the compounds of interest, a Remedial Action Plan (RAP) will be developed over a limited period of time. While the RAP is being developed, monitoring at an increased frequency will occur. Based on the frequency of statistically significant increase of the concentrations of the parameters monitored in the ground water, EPA will make a decision regarding the need to implement a remedial action. This decision process will be delineated in the RD stage. At no time will discharges to the Maumee River exceed the State of Indiana acute Water Quality Standards for the protection of aquatic life.

B. Western Portion of the Site

The primary components for the remedy on the western portion of the site are:

- Access restrictions (fencing and deed restrictions)
- Groundwater collection and treatment
- Excavation of risk-based Area C for drum removal
- Incineration of drummed wastes
- Reconsolidation of soils/wastes on-site
- Soil cover
- Flood protection and wetlands protection

1. Access Restrictions

As the remedy will leave materials on-site above health-based levels, access restrictions are necessary to ensure overall protection of human health and the environment. Installation of a fence at the site will deter trespassers and assist in preserving the integrity of the soil cover. Deed restrictions will be implemented to control future development and groundwater use at the site.

2. Groundwater Collection and Treatment

The risk assessment identified the groundwater and groundwater seeps discharging to the Maumee River as exceeding the State of Indiana acute water quality standards. By installing a groundwater collection system downgradient of the wastes, this unacceptable discharge is controlled. The performance goals of the collection system are to: collect groundwater prior to discharge into the Maumee River and reduce infiltration into the collection system from river recharge.

The fate of the collected groundwater will be determined during the RD phase of the project. Based on current information, it is not known whether treatment of the collected groundwater will be necessary. If the combined groundwater meets the following two criteria, monitoring rather than treatment would be acceptable prior to discharging it to the Maumee River:

- the contaminant levels present in the combined groundwater flow meets the NPDES permit limits established for a discharge to the Maumee River; and
- the contaminant levels present in the combined groundwater flow are at or below those levels achieved by the Best Available Technology (BAT).

If the contaminant levels present in the combined groundwater flow exceed these criteria, then groundwater treatment prior to discharging to the Maumee River would be necessary. This can be accomplished by an on-site treatment plant. The other option would be using the POTW. Any discharge to the POTW would have to meet the pretreatment standards of the POTW.

The removal of drums, a primary source for groundwater contamination, may impact the length of time groundwater collection and monitoring or treatment is necessary. Therefore, a review program will be established during the RD phase of the project. The purpose of this review program is to establish set periods in time when U.S. EPA in conjunction with IDEM will evaluate all the data pertaining to the groundwater collection and treatment, or groundwater collection and monitoring, program in place. Based on the review, U.S. EPA in conjunction with IDEM can then decide whether to continue, modify or eliminate the program in place.

3. Excavation of Risk-based Area C for Drum Removal

This component of the remedy includes the removal of drums. The area to be excavated is that portion of the site defined as risk-based Area C. A total of 4,600 intact drums is estimated to be contained in Area C. The removal of 4,600 drums represents a maximum reduction in drums containing liquids in the western portion of the site.

4. Incineration of Drummed Liquids

This component requires the drummed liquid wastes be incinerated. The FS specified incineration being implemented at an off-site RCRA compliant incinerator. The selected remedy however is best configured to allow for the option of incinerating the drummed liquids on-site or off-site, depending on which option is less costly at the time of remedy implementation. The short-term risks to the community during on-site incineration are manageable, and balance against the risks to the community during the off-site transport of wastes to an off-site incinerator.

5. Reconsolidation of Soils/Wastes On-site

This component of the remedy requires the reconsolidation of the excavated soils/wastes on-site. Although incinerating the soils/wastes would provide for a complete destruction of the organic compounds, the incineration process might result in a potentially toxic ash. This ash would be redeposited on-site and the inorganic constituents in the ash would present a risk to the environment. Therefore, a minimal reduction in risk is obtained by incinerating the soils/wastes. Incinerating the soils/wastes would however result in a significant cost increase (5 to 7 times the capital cost of Alternative 4C). A comparison of the benefits (risk reduction) received from incinerating the soils/wastes to the associated cost increase makes incinerating the soils/wastes impractical. In addition, the other components of this remedy ensure adequate protection is provided against the soils/wastes reconsolidated at the site.

6. Soil Cover

After considering the remedial action goals for the site, the other components in the remedy and the technical information on the site, it was determined that a hybrid closure under CERCLA authority is the appropriate closure for the western portion of the site. This hybrid closure is basically a soil cover that meets the following requirements:

- A compacted cover that is applied, compacted and maintained continuously over any point of the area.
- The final cover shall have a slope of not less than 2% and not greater than 33%.
- The cover soil shall be of a Unified Soil Classification of ML, CL, MH, CH or OH, or other material determined to be suitable.
- The maximum projected erosion rate shall be 5 tons per acre per year.

In addition, a maintenance program inclusive at a minimum of the following, will be necessary for the soil cover:

- Inspections
- Maintenance of final cover and vegetation
- Maintenance of the final contours to provide for minimum slope and no ponding of water
- Control of vegetation

7. Flood Protection and Wetlands

This remedy requires the implementation of flood protection measures as part of the site is located within the 100-year floodplain. In addition, all construction activities under this remedy should not adversely impact the two on-site wetlands. If an adverse impact to either wetlands is unavoidable than the loss should be compensated through enhancement of an on-site wetlands.

XI. STATUTORY DETERMINATIONS

U.S. EPA and IDEM believe the selected remedy satisfies the statutory requirements to : Protect human health and the environment, attain ARARs, be cost-effective, utilize permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable and provide the preference for treatment as a principal element.

A. Protection of Human Health and the Environment

The selected remedy (Alternative 4C) provides protection of human health and the environment through a combination of treatment and engineering and institutional controls.

1. Municipal Landfill

The risk assessment indicates this portion of the site does not pose a threat through direct contact with surface soils or migration of groundwater to the Maumee River. The primary focus for this component of the remedy is monitoring future potential risks associated with this portion of the site by implementing a long-term groundwater monitoring program and providing a Subtitle D - solid waste landfill closure (soil cover with flood protection measures). This is the appropriate extent of action needed at this time to ensure protection of human health and the environment.

2. Western Portion of the Site

Excavation for buried drums and incineration of the drum contents will provide a significant reduction in the primary source of contaminant releases to subsurface soils and groundwater. The groundwater collection system adequately addresses the currently unacceptable groundwater and groundwater seep discharge to the Maumee River. In addition, the groundwater collection system will adequately address any future migration of contaminants into groundwater from the contaminated soils/wastes remaining on-site. The collected groundwater will be properly treated, if determined to be necessary, and discharged. The soil cover and access restrictions, controlling future uses of the site, eliminate any direct contact threat due to the contaminated soils/wastes remaining at the site. The use of flood protection measures will ensure the contaminated soils/wastes remaining on-site within the floodplain are not exposed, thereby eliminating any threats associated with exposed soils/wastes.

The short-term impact of the drum excavation and on-site construction are manageable and can be accomplished in an environmentally sound fashion. Likewise, the off-site transport or on-site incineration of the estimated 4,600 drums present manageable short-term impacts.

B. Attainment of Applicable or Relevant and Appropriate Requirements (ARARs)

The selected remedy - Alternative 4C - will meet all ARARs of Federal, and more stringent State environmental laws. Table 14 presents the ARAR requirements for the selected remedy. Two types of ARARs addressed in Table 14 warrant further explanation: closure requirements, and contaminant concentration limits in groundwater.

The closure requirements of the Resource Conservation Recovery Act (RCRA) are not "applicable" because the wastes at the site were landfilled before RCRA requirements took effect, and implementation of the selected remedy will not constitute new land disposal of the wastes.

Under the selected alternative, waste currently present on the western portion of the site will be excavated to allow for the removal of drums, the soil and wastes will then be reconsolidated in the ground within the area of contamination. This reconsolidation of soil and waste does not constitute disposal of the material so RCRA Subtitle C closure requirements are not applicable, but they are relevant. After considering RCRA Subtitle C closure in place for the western portion of the site, it was determined that it would not be appropriate based on the characteristics of the site (See discussion in Table 14, Action Specific ARARs, under potential ARAR: 40 CFR 264). Under the circumstances present, it is more appropriate to pursue a "hybrid" closure approach, similar to the approach outlined in the proposed RCRA regulations at 52 Federal Register 8712 (march 19, 1987). While RCRA Subtitle C closure is thus determined not to be an ARAR for the western portion of the site, the selected "hybrid" closure combines certain appropriate aspects of RCRA "clean closure" with appropriate aspects of RCRA "closure in place" and a purge and treat system for contaminated groundwater.

The eastern portion of the site primarily contains municipal refuse. Closure under RCRA Subtitle D, as described in Indiana requirements, is not applicable due to the dates the landfill was operated, but it is relevant and appropriate and thus determined to be the action specific ARAR for closure of this portion of the site. (See discussion in Table 14, Action Specific ARARs, under potential ARARs: Indiana Requirements: Solid Waste Management Permit Regulations).

An evaluation of closure options is further discussed in the FS (pages 4-9 to 4-11).

Maximum Contaminant Levels (MCL) and Maximum Contaminant Level Goals (MCLG) under the Safe Drinking Water Act are similarly not ARARs for this site. As the affected groundwater is not a drinking water source, MCLs and MCLGs are not "applicable" standards. Further, since little potential for future use of the affected groundwater between the source of contamination and the known projected points of groundwater discharge into the Maumee River adjacent to the site, MCLs and MCLGs are not "relevant and appropriate" standards. As noted above in the Selected Remedy Section, SARA Section 121(d)(2)(B)(ii) specifically recognizes that circumstances such as those at this site are appropriate for application of Alternative Concentration Limits (ACL) as determined by a process set out in RCRA regulations at 40 CFR 264.94. While this RCRA ACL regulation is not applicable (see closure discussion above), it is relevant and appropriate at this site. The process of determining the ACLs will take place during the RD.

C. Cost-Effectiveness

1. Municipal Landfill

The components selected represent the most cost-effective means for addressing the long-term concerns associated with this portion of the site.

2. Western Portion of the Site

The costs associated with the following components of the selected remedy - Alternative 4C - are necessary to protect human health and the environment:

- Access restrictions
- Groundwater Collection System
- Groundwater treatment, if necessary
- Flood protection and wetlands protection

The additional cost associated with excavating and incinerating the drum contents from risk-based Area C ensures the drum contents are permanently treated. Incinerating the drum contents provides for a maximum reduction in the contaminants associated with the drum contents. Permanent treatment can not be gained for any lesser costs and the wastes of most concern, due to their toxic and mobile nature, are treated. Although Alternatives 4A and 4B include drum removal as a component, they do not provide as significant a reduction in the number of drums at the site. As the increase in capital costs from Alternative 4A to 4C is only slight and Alternative 4C achieves the most contaminant

ble 14
Review of Contaminant Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status		Discussion
			Applicable	Relevant and Appropriate	
FEDERAL REQUIREMENTS					
[illegible]servation and Recovery Act (RCRA)					
[illegible] .64 Subpart F Requirements for [illegible]	RCRA (part 264) establishes requirements for groundwater protection for RCRA regulated units, including ground-water protection standards. Need to establish how the subpart F requirements apply to remedial actions.	Cleanup to background or drinking water standards or set a level that is protective to public health or the environment.	No	Potentially	Groundwater protection levels based on surface water exposures may be relevant and appropriate because actions at the site may fit the CERCLA 121(d)(2)(B)(ii) conditions; known entry of groundwater into surface water; no increase projected at the surface water body; and remedial action includes enforceable measures which preclude human exposure to groundwater.
[illegible]water Act (CWA)					
[illegible] 122, 125 National Pollutant [illegible]charge Elimination Systems (NPDES)	This section of the CWA regulates the discharge of water into surface water bodies. The remedial alternatives may inclue the discharge of treated or untreated groundwater to the Maumee River.	The State of Indiana has authorization to administer NPDES in Indiana. Refer to the state ARAR section for specific requirements.	Yes	-	NPDES discharge requirements are applicable. Numerical discharge requirements will have to be met.
[illegible] 403 Effluent Guidelines and [illegible] Pretreatment Standards	This section establishes pretreatment standards(both general and categorical) for the control of pollutants discharges into POTWs. The remedial alternatives may include the discharge of treated or untreated groundwater to the local POTW.	Discharge to POTW must not cause violation of specific prohibitions or limitations.	Yes	-	Pretreatment requirements will have to be met for discharge to POTW.
[illegible] Water Quality Criteria	Water quality criteria are used in conjunction with designated use for the stream to establish water quality standards for the stream. The site discharges to the Maumee River. Extracted/treated groundwater may also be discharged to the river.		No	"To be considered".	State water quality standards are applicable for determination of compliance. Where there are no state standards for a given parameter, Federal Ambient Water Quality Criteria can be used for guidance.
[illegible] Drinking Water Act					
[illegible] CFR 141.11 - Maximum Contaminant Levels	SDWA MCL sets enforceable standards for public water systems. Need to determine if these standards should be applied as a cleanup level for the shallow groundwater.?		No	No	Groundwater is not a drinking water source nor does it have the potential for use due to limited quantity
[illegible] CFR 141.50 - Maximum Contaminant Level [illegible]	SDWA MCLGs sets nonenforceable health goals for public water systems. Need to determine if these standards should be applied as a cleanup level for the shallow groundwater.?		No	No	Groundwater is not a drinking water source nor does it have the potential for use due to limited quantity

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Table 14
Review of Contaminant Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	 Relevant and Appropriate	Discussion
Clean Air Act (CAA)					
CAA Section 109 and 40 CFR 50 National Ambient Air Quality Standards	Sets national ambient air quality standards to attain and maintain primary and secondary standards to protect public health and the environment. Need to determine how aspects apply to remedial actions. Remedial actions which may result in new sources of air emissions including incineration and excavation.	Emission standards	Yes	-	Fugitive dust from excavation would would have to attain NAAQS for PM10
CAA Section 111 New Source Performance Standards	Promulgates standards for new sources of air emissions. Need to determine if apply to potential remedial actions.	Requirements are source specific	No	Potentially	Not applicable because NSPS are for specific source types, however, may be relevant and appropriate if the pollutant emitted and the technology employed during cleanup are sufficiently similar to the one for which there is a NSPS
CAA Section 112 National Emissions Standards for Hazardous Air Pollutants	Establishes emission standards for hazardous air emissions. The remedial actions may result in the emissions of pollutants and need to establish whether the NESHAPs apply.	Numerical standards for specific sources of specific pollutants.	No	Potentially	NESHAPs are not generally applicable to CERCLA actions because CERCLA sites do not generally contain one of the specific source categories regulated. NESHAPs as a whole are generally relevant and appropriate because the standards of control are intended for the specific type of source regulated. Part of a NESHAP may be relevant and appropriate if a specific pollutant for which there is a NESHAP is present in an air emission.

Table 14
Review of Contaminant Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	 Relevant and Appropriate	Discussion
STATE REQUIREMENTS					
water Quality Standards 3 IAC 1-1-6 Current Standards	Standards set water quality standards for the protection of various stream use designations. The site discharges to the Maumee River.	Current water quality standards are descriptive. Set for specific uses, both inside and outsides zone of mixing.	Yes	-	Can be used to set goals for discharges to the Maumee River. However, proposed standards may be appropriate in that they are quantitative.
327 IAC 2-1-6 Proposed Standards	Standards set water quality standards for the protection of various stream use designations. The site discharges to the Maumee River.	Proposed standards are quantitative with specific values for specific uses(within and outside the mixing zone).	-	"To be considered"	Although proposed, they provide the quantitative information necessary to set goals for discharges to the Maumee River.
IAC 1-1-7 Current Standards	Standards set water quality standards for underground waters of the site	Requires underground waters to meet the applicable minimum water quality conditions for either a potable or an industrial source	No	Potentially --	As the conditions at the site fit the requirements of CERCLA 121(d)(2)(B)(ii) and groundwater as a potable or industrial source is restricted by limited aquifer productivity, these requirements are relevant but not appropriate.
327 IAC 2-1-7 Proposed Standards	Standards set water quality standards for underground waters of the site	Requires underground waters to meet the applicable minimum water quality conditions for either a potable or an industrial source	No	"To be considered"	As the conditions at the site fit the requirements of CERCLA 121(d)(2)(B)(ii) and groundwater as a potable or industrial source is restricted by limited aquifer productivity, these requirements are relevant but not appropriate.
Pretreatment Programs (NPDES) IAC 5-1-1	Extracted treated groundwater may be discharged to the Maumee River	Effluent limits will be developed based on the effluent quality, receiving stream properties, and the appropriate water quality criteria.	Yes	-	NPDES discharge requirements are applicable. Numerical discharge requirements will have to be set.
LOCAL REQUIREMENTS					
Municipal Code Chapter 28	Extracted treated groundwater may be discharged to the local POTW	Discharge to the POTW must not cause a violation of specific prohibitions or limitations	Yes	-	Pretreatment requirements will have to be set for discharge to POTW.

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	ARAR Status Relevant and Appropriate	Discussion
FEDERAL REQUIREMENTS					
Resource Conservation and Recovery Act (RCRA)					
40 CFR 261: Definition and identification of hazardous waste	RCRA (part 261) establishes basic definitions of solid and hazardous wastes. Waste material and contaminated media are present at the site. Remedial actions may produce potentially hazardous residuals. Need to identify whether these materials are potentially subject to requirements under RCRA.	Waste is subject to regulation under RCRA if: 1. Waste exhibits one of four characteristics (ignitability, corrosivity, reactivity, or EP toxicity); 2. Wastes are listed as hazardous; 3. Wastes are mixtures wastes listed as hazardous by RCRA regulations	Potentially	Potentially	Offsite Actions - Treatment residuals will have to be analyzed for the appropriateness of a hazardous designation. Onsite Actions - As any action is part of a CERCLA activity, hazardous designation is not appropriate.
40 CFR 262: Standards for generators of hazardous waste	RCRA (part 262) establishes regulations covering activities of generators of hazardous waste. Need to identify whether generator requirements extend to CERCLA actions hazardous waste.	Generator requirements include identification of waste generation activity, obtaining EPA ID number, record keeping, and use of uniform national manifest.	Potentially	Potentially	Offsite Actions - As remedial actions could result in treatment residue deemed hazardous, these requirements would be applicable. Onsite Actions - If wastes are managed onsite as part of a CERCLA action these requirements would not be appropriate.
40 CFR 263: Standards for transport of hazardous waste	RCRA (part 263) establishes regulations covering the transport of hazardous waste. Need to identify whether these apply to offsite actions.	The transport of hazardous waste is subject to requirements including DOT regulations, manifesting, record keeping, and discharge cleanup.	Yes	-	If materials categorized hazardous under RCRA are taken offsite their transport will be subject to requirements.
40 CFR 264: Standards for treatment of hazardous waste	RCRA (part 264) establishes regulations covering the treatment, storage, and disposal of hazardous waste. Need to identify who these apply to remedial actions at this site.				
	• Offsite incineration is considered for this site	Offsite incinerator would need to be permitted and fully compliant as defined by EPAs Offsite Policy.	Yes	-	Offsite incineration would be considered a treatment under RCRA and would have to be conducted at a fully RCRA-permitted and compliant offsite facility.
	• Onsite incineration is considered a viable remedial action for waste treatment. It would require a mobile unit to come onto the site.	Onsite incineration will have to meet the performance standards listed in 40 CFR 264.340-264.351. The requirements include waste analysis, monitoring, inspections, and closure standards. An incinerator burning hazardous waste must achieve a destruction removal efficiency of 99.99% for each principal organic hazardous constituent. If dioxins or PCBs are present will have to achieve 99.9999% destruction. In addition, a trial burn or submittal of a trial burn plan is required (40 CFR 270.62 and 270.19) for a new hazardous waste incinerator.	Yes	-	This CERCLA activity at the site constitutes treatment as defined under RCRA and thereby is subject to RCRA regulations
	• Contaminated groundwater would be collected and treated prior to discharge. Need to determine if constitutes RCRA treatment.	RCRA requirements for treatment apply if the waste is a RCRA waste and the activity constitutes treatment as defined by RCRA.	No	No	An onsite water treatment unit would meet the definition of a waste water treatment unit (40CFR 260.11) and would not be regulated under RCRA but more like units regulated under Section 402 or 307 of the Clean Water Act.

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	 Relevant and Appropriate	Discussion
40 CFR 257: Standards for solid waste sal Facilities	RCRA Subtitle D (part 257) establishes guidelines for land disposal facilities for nonhazardous solid waste. Remedial actions may leave wastes in place, consolidate wastes, or dispose of treatment residues onsite. Need to determine how closure and disposal apply to this site. Because the site has two distinct areas, the characteristics of the areas need to be considered. Eastern areas (1) Portion does not present a direct contact threat;(2) Current release to the river is protective;(3) Majority of waste is general refuse.	General requirements for land disposal facilitities. Specific solid waste management issues are reserved for the state. Refer to section on Indiana ARARs.	No	Potentially	Closure requirements under RCRA Subtitle D (as detailed in the Indiana requirements) govern closure of nonhazardous solid waste including municipal refuse. The material in the eastern portion of the site is primarily municipal refuse. Therefore, Subtitle D closure requirements are appropriate for this portion of the site.
	Western areas (1) The majority of material is hazardous; (2) Relatively large volume of waste present ;(3). There is a minimal direct contact threat ; (4) The potential for migration of contaminants to the groundwater and susequently to the river is present;(5) Total groundwater discharge from the site is extremely small		No	Potentially	Because of the volume of hazardous substances in the western portion of the site, Subtitle D Solid Waste Landfill closure is relevant but not appropriate.
Water Act (CWA)					
CFR 122, 125 National Pollutant charge Elimination System (NPDES)	This section of the CWA regulates the discharge of water into surface water bodies. The remedial alternatives may include the discharge of treated or untreated groundwater to the Wabash River.	The State of Indiana has authorization to administer NPDES in Indiana. Refer to the state ARAR section for specific requirements.	Yes	-	NPDES discharge requirements are applicable and substantive discharge requirements will have to be met, although administrative requirements (a permit) will not be required because action is onsite.
40 CFR 403 Effluent Guidelines and [illegible] Pretreatment Standards	This section establishes pretreatment standards(both general and categorical) for the control of pollutants discharges into POTWs. The remedial alternatives may include the discharge of treated or untreated groundwater to the local POTW.	Discharge to POTW must not cause pass through, interference, violation of specif prohibitions, or violations of local limitations or ordinances. POTW should either have an EPA-approved pretreatment program or have sufficient mechanisms to meet the requirements of the national pretreatment program in accepting CERCLA waste.	Yes	-	Pretreatment requirements will have to be met for discharge to POTW.
404 Dredge and Fill Requirements	Regulates the discharge of dredged or fill material into the waters of the U.S. Authority under Section 404 of the CWA extends authority to include activities affecting wetlands/floodplains	An evaluation of the probable impacts , including cumulative impacts of the proposed activity on the public interest.	Yes	-	Activities will be in a floodplain and a wetland. This may invoke Section 404 requirements although no permit will be required. See location specific ARARs for wetlands and floodplains.

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	 Relevant and Appropriate	Discussion
EPA Ground Water Protection Strategy					
	The protection strategy does not involve potential ARARs but does contain policy statements to be considered. The strategy includes classification of aquifers. Need to determine if the groundwater protection strategy will cause groundwater restoration to be considered.	The strategy includes guidelines on classifying groundwater for EPA decisions affecting groundwater protection and corrective actions. Criteria includes ecological importance, replaceability, and vulnerability considerations.	No	"To be considered"	The shallow aquifer is currently not in use. The useability is limited by quantity. Consequently, aquifer restoration is not be considered as a remedial goal. In addition, site conditions meet the requirements of CERCLA 121(d)(2)(B)(ii).
Clean Air Act (CAA)					
CAA Section 109 and 40 CFR 50 National Ambient Air Quality Standards	Sets national ambient air quality standards to attain and maintain primary and secondary standards to protect public health and the environment. Need to determine how aspects apply to remedial actions. Remedial actions which may result in new sources of air emissions including incineration and excavation.	Pre-Construction Review	No	Potentially	Purpose of this review is to obtain construction permit. CERCLA 121 (e) exempts onsite activities from obtaining permits. However, this review would set requirement to fulfill substantive requirements and conditions of the permitting process.
		Major source permit PSD permit Nonattainment area permit Visibility permit	No	Potentially	Not anticipated that emissions from the CERCLA activities would qualify as major sources. If not a major source would be exempt from substantive requirements of major source permits, PSD review, nonattainment review, or visibility permit. Therefore, these requirements are relevant but not appropriate.
CAA Section 111 New Source Performance Standards	Promulgates standards for new sources of air emissions. Need to determine if apply to potential remedial actions.	Requirements are source specific	No	Potentially	Not applicable because NSPS are for specific source types, however, may be relevant and appropriate if the pollutant emitted and the technology employed during cleanup are sufficiently similar to the pollutant and the source. May be relevant and appropriate for incineration. Would not be relevant and appropriate for excavation, because source(i.e., excavation) is not similar. May be a to be considered for volatile emissions from excavations because of similarity of pollutants at site to those sought to be controlled.

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	ARAR Status Relevant and Appropriate	Discussion
40 CFR 264: Standards for disposal of hazardous waste	RCRA (part 264) establishes regulations covering the disposal of hazardous waste. Remedial actions may leave wastes in place, consolidate wastes, or dispose of treatment residues onsite. Need to determine how closure and disposal apply to this site. Because the site has two distinct areas, the characteristics of the areas need to be considered.	The following are closure options: Clean closure: Under this closure (264 Subpart G) guidance is that any contaminants left in the soil will not impact any environmental media in excess of agency established levels that will not result in a threat to human health and the environment .. Must be met within the facility boundary.	No	Potentially	Relevant to the western portion of the site because it contains hazardous waste. Appropriate if the remedial action can remove the wastes. Relevant but not appropriate to eastern portion of the site because of small volume of hazardous waste relative to the volume of the municipal landfill and lack of demonstrated risk.
	Western area: (1) The majority of material is hazardous; (2) Relatively large volume of waste present;(3). There is a minimal direct contact threat; (4) the potential for migration of contaminants to the groundwater and susequently to the river is present; (5) Total groundwater discharge from the site (including infiltration) is extremely small.	Landfill closure: Under this closure (264 Subpart N) the following elements are included: Final cover to minimize migration of liquids, have minimal maintenance, promote drainage, minimize erosion, accommodate settling and maintain integrity, and cover/cap permeability of less than the natural subsoils or liner. Includes post closure maintenance and monitoring	Potentially	Potentially	Applicable to the western portion of the site, if the alternative contains disposal. Relevant but not appropriate for the western portion of the site. See the discussion below on Hybrid closure.
	Eastern area: (1) Portion does not present a direct contact threat;(2) Current release to the river is protective;(3) Majority of waste is general refuse. Need to determine what site activities would trigger RCRA disposal requirements.	Hybred closure: Under this closure the purpose is to design and fashion a closure that combines the relevant and appropriate portions of Subtitle C Clean Closures and Subtitle C Landfill closures in relation to site specific requirements. This is accomplished under CERCLA authority rather than RCRA authority.	No	Potentially	For the western portion of the site each of the alternatives contains a groundwater collection system. Reducing infiltration will not change the time or cost of groundwater collection. Infiltration will by flushing, potentially reduce the mobility, toxicity, and volume of the contaminants in the soils. These facts in combination with the other site specific conditions make a "hybred closure" relevant and appropriate for this portion of the site Relevant but not appropriate to eastern portion of the site because of small volume of hazardous waste and lack of demonstrated risk.

Table 14 Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	Applicable	Relevant and Appropriate	Discussion
Occupational Safety and Health Act					
29 CFR 1910 General standards for worker protection	Provide a safe workplace	General requirements in OSHA to provide a workplace free of harm	Yes		Applies to all workplaces
29 CFR 1910. Requirements for workers involved in hazardous waste operations	Regulate training, protective equipment, proper handling of wastes, monitoring of employee health, site information, and emergency procedures for workers at hazardous waste operations.	Specific requirements in OSHA regulations.	Yes		Applies to all workers on the site property during construction and operation of remedial actions.
Hazardous Materials Transportation Act					
49 CFR Parts 100 through 199 Transportation of Hazardous Materials	Regulates the transport of hazardous materials. Need to determine how this applies to remedial actions.	Specific DOT requirements for labelling, packaging, shipping paper/manifesting, and transport by rail, aircraft, vessel, and highway.	Potentially		If the remedial action involves the offsite transport of waste, RCRA requires for the transportation of wastes be consistent with DOT regulations would be applicable.
National Environmental Policy Act					
Section 102(2)(c)	The evaluation of the environmental impact of federal actions. Need to determine the applicability of NEPA to the site remedial actions.	A statement of environmental impact.	No	No	CERCLA actions are exempted from the NEPA requirement because EPA's decision making process in selecting a remedial action alternative is the functional equivalent of the NEPA analysis.
Intergovernmental Review of Federal Programs Exec. Order 12372					
40 CFR 29	State and local coordination and review of proposed EPA assisted projects	EPA administrator is required to communicate with state and local officials to explain the project, consult with other affected federal agencies, and provide a comment period for state review.	Yes	-	Project requires intergovernmental review since project will use federal funds
INDIANA REQUIREMENTS					
Hazardous Waste Management Program					
320 IAC 4.1 Hazardous waste identification, standards for generators	Rules cover the regulations for identification of hazardous waste and standards for generators.	See federal requirements under RCRA. State program for the implementation of regulations under RCRA. Federal RCRA program will apply since state requirements are substantially equivalent.	See determination and discussions Federal requirements under RCRA.		See determination and discussions Federal requirements under RCRA.
Standards applicable to owners and operators of hazardous waste facilities	Standards applicable to owners and operators of hazardous waste facilities.				
Closure/postclosure	Standards for closure/postclosure of hazardous waste storage, treatment, disposal facilities.				
Solid Waste Management Permit Regulations 320 IAC 5	Requirements for the closure of a solid waste management facility. Remedial actions may leave wastes in place, consolidate wastes, or dispose of treatment residues onsite. Need to determine how closure and disposal apply to this site. Because the site has two distinct areas, the characteristics of the areas need to be considered.	Final cover of two feet. Slope less than two percent and without depressions.			
	Western areas (1) the majority of material is hazardous; (2) Relatively large volume of waste present(3). There is a minimal direct contact threat; (4) the potential for migration of contaminants to the groundwater and consequently to the river is present; (5) total groundwater discharge from the site is extremely small.		Potentially	Potentially	Closure requirements under RCRA Subtitle D (as detailed in the Indiana requirements) govern closure of nonhazardous solid waste including municipal refuse. The material in the eastern portion of the site is primarily municipal refuse. Therefore, Subtitle D closure requirements are appropriate for this portion of the site.
	Eastern areas (1) Portion does not present a direct contact threat; (2) Current release to the river is [illegible]; (3) Majority of		No	Potentially	Because of the volume of hazardous substances in the western portion of [illegible]

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	ARAR Status Relevant and Appropriate	Discussion
Management Permit Regulations [illegible] 4 - 2 - 4 Proposed Rules	Requirements for the closure of a solid waste management facility. Remedial actions may leave wastes in place, consolidate wastes, or dispose of treatment residues onsite. Need to determine how closure and disposal apply to this site. Because the site has two distinct areas, the characteristics of the areas need to be considered.	Final cover of two feet. Slope less than two percent and without depressions.			
	Western areas: (1) The majority of material is hazardous; (2) Relatively large volume of waste present; (3). There is a minimal direct contact threat; (4) The potential for migration of contaminants to the groundwater and susequently to the river is present; (5) Total groundwater discharge from the site is extremely small.		No	"To be considered"	Closure requirements under RCRA Subtitle D (as detailed in the Indiana requirements) govern closure of nonhazardous solid waste including municipal refuse. The material in the eastern portion of the site is primarily municipal refuse. Therefore, Subtitle D closure requirements are appropriate for this portion of the site.
	Eastern areas: (1) Portion does not present a direct contact threat; (2) Current release to the river is protective; (3) Majority of waste is general refuse.		No	Potentially	Because of the volume of hazardous substances in the western portion of the site, Subtitle D-Solid Waste Landfill closure is relevant but not appropriate.
Waste Treatment Facilities Regulations					
3.1 (330 - IAC) Facility Construction	This rule regulates the construction of waste treatment facilities. The remedial actions may require that an onsite treatment plant is constructed.		Yes	-	Alternatives requiring the construction of an onsite treatment plant will have to follow the substantive requirements of this rule.
Water Pollution Control Board					
5 Industrial Pretreatment and NPDES					
1-10 NPDES Permit	This rule covers the requirements for discharge under an Indiana NPDES. Remedial actions result in a discharge of groundwater or treated groundwater.		Yes	-	The substantive requirements of a NPDES permit are applicable to discharges.
11-15 Pretreatment Standards	This section establishes pretreatment standards for the control of pollutants discharges into POTWs. The remedial alternatives may include the discharge of treated or untreated groundwater to the local POTW.	Discharge to POTW must not cause pass through, interference, violation of specif prohibitions, or violations of local limitations or ordinances.	Yes	-	Pretreatment requirements will have to be met for discharge to POTW.
Air Pollution Control					
4 & 6	Fugitive dust during construction	Requires every available precaution to taken during construction to minimize fugitive dust emissions	Yes	-	Construction actions could generate dust so this regulation would apply
[illegible] 8-1-1-7	VOC emissions from site activities				
[illegible] 8-1-1-6			Yes	-	Actions could generate VOC emissions, so these regulations would apply

Table 14
Review of Action Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	ARAR Status Relevant and Appropriate	Discussion
[illegible] Act	Well Construction and Abandonment		Yes	-	
LOCAL REQUIREMENTS					
[illegible] Municipal Code	Extracted/treated groundwater may be discharged to the POTW	Discharge to POTW must not cause a violation of specific prohibitions or limitations	Yes	-	Any discharges will have to comply with pretreatment requirements.

Table 14
Review of Location Specific ARARs

Potential ARAR	Issues	Requirements	ARAR Status Applicable	 Relevant and Appropriate	Discussion
Conservation and Recovery Act (RCRA)					
40 CFR 264a location standards for disposal of hazardous wastes location within 100-year floodplain (40 CFR 264.18(b)).	RCRA (part 264) establishes regulations covering the disposal of hazardous waste. Remedial actions may leave wastes in place, consolidate wastes, or dispose of treatment residues onsite. Need to determine how location standards apply to this site.	Facility must be designed, constructed, operated, and maintained to avoid a washout.	No	Potential	The site is located within a floodplain. For any construction of a new facility within the floodplain, this requirement will be relevant.
red Species Act					
Section 7(c)	Protection of endangered species and critical habitats	Agency required to consult with Fish and Wildlife Service if action may affect species or critical habitat. If an endangered species or critical habitat may be impacted, a biological assessment(BA) is required to determine any possible impacts of the proposed action. If BA indicates that the project will affect a species, EPA must request a biological opinion(BO) by initiating the formal consultation process with regional FWS office.	Yes	-	Site is within the range of Federally endangered species (Indiana bat and the white cat's paw pearly mussel). Process will have to be fulfilled. Existing ACOE assessment may partially fulfill requirements.
and Wildlife Coordination Act					
	Protection of fish and wildlife when Federal actions result in the control or modification of a natural stream or body of water.	Determine whether the action will result in the control or modification of a body of water, including actions that discharge pollutants into a body of water or wetlands and construction of dams, leavees, etc. Consultation with Fish and Wildlife Service required to develop methods to protect wildlife.	Yes	-	Potential remedial actions may result in discharge.
tive Orders for Flood Plains (EO11988)					
40 CFR Part 6 Subpart A	Protection of floodplains. To avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values. Actions may occur in floodplain, need to access applicability.	Avoid work in wetland where practicable. Prevent runoff and sedimentation of wetlands. Avoid loss of floodplain values. Incorporate measures to avoid transport of sediment to the river. Minimize encroachment of equipment and structures into areas of the river used for boating.	Yes	-	Actions will take place in a floodplain.
Executive Orders for Wetlands (EO11990)					
40 CFR Part 6 Subpart A	Protection of wetlands. To avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values. Actions may occur in wetlands, need to access applicability.	If onsite wetlands are lost as a result of actions, the loss must be mitigated by restoration or creation of other wetlands.	Yes	-	Actions will take place in a wetland.
STATE REQUIREMENTS					
[illegible] Control Act [illegible]	Regulates any construction within the floodway	To ensure compliance with the substantive portions of this regulation, consultation during design and construction with the Indiana Department of Natural Resources is required.	Yes	-	Actions will take place in a floodplain

reduction, it was determined that Alternative 4C provides the best balance between benefits achieved and cost.

Alternative 5 (A, B, C) is the only alternative besides Alternative 4 to provide treatment of the waste materials on-site. Alternative 5 (A, B, and C) includes incineration of the contaminated soils/wastes as well as the drum contents. Alternative 5A does not provide as much treatment as Alternative 4C but would cost more than Alternative 4C. Alternatives 5B and 5C provide treatment to areas relatively the same size as Alternative 4C and the incineration of both drum contents and soils/wastes from these areas would provide a greater degree of cleanup. Although incineration would provide a complete reduction of organic contaminants in the soils/wastes, the potentially toxic ash from the incineration process would be buried on-site. By redepositing the ash on-site, the collection of groundwater and a long-term management program would still be required for the site. In addition the cost of Alternative 5B and 5C is 5 to 7 times the capital cost for Alternative 4C. As Alternative 5B and 5C do not provide a proportionally greater reduction in risk to the environment for the additional cost, the cost-effectiveness of these alternatives is questionable.

Although Alternatives 2 and 3 are less costly than the selected remedy, the long-term uncertainties associated with solely containment type remedies increases the potential for future remedial action costs. Therefore, these alternatives do not provide the most cost-effective solution to the site problems.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

1. Municipal Landfill

The risk assessment did not indicate a need to pursue any action on this portion of the site beyond long-term management. If a need to pursue further action arose, the more permanent solutions, such as incineration, would be too costly. This is primarily due to the size of the area, and technical uncertainties caused by the heterogeneous waste type in this area of the site.

2. Western Portion of the Site

The selected remedy - Alternative 4C - focuses on providing permanent and significant treatment for a portion of the wastes of concern (drummed liquids). Identification, excavation, and treatment of these wastes is implementable. The alternatives providing a greater degree of permanence present significant cost and implementability issues rendering such alternatives not practicable.

E. Preference for Treatment as a Principal Element

1. Municipal Landfill

As the only action required as determined by the risk assessment at this time is a long-term management program, treatment as a principal element is not warranted.

2. Western Portion of the Site

Treatment of the drummed liquid wastes to reduce the toxicity, mobility and of the hazardous substances in this portion of the site is permanent. Therefore, the preference for treatment as a principal element is met by the selected remedy.

APPENDIX A

FORT WAYNE REDUCTION

RESPONSIVENESS SUMMARY

FORT WAYNE REDUCTION
FORT WAYNE, INDIANA
RESPONSIVENESS SUMMARY

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, The United States Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM) recently held a public comment period from May 4, 1988, to June 7, 1988. The purpose of this public comment period was to permit interested parties to comment on EPA's Feasibility Study (FS) and Proposed Plan for addressing the problems at the Fort Wayne Reduction site. A public meeting was held May 11, 1988, to present the FS and Proposed Plan.

The purpose of this Responsiveness Summary is to document EPA's responses to comments and criticisms received during the public comment period. All of the comments summarized in this document were considered prior to EPA's final decision.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

The EPA has been responsible for conducting the community relations program for the site. Assistance was provided by IDEM throughout the process.

A community relations plan was submitted and approved by EPA in May, 1986. While developing the community relations plan, residents of the Riverhaven community expressed concern over the quality of their drinking water. The Riverhaven community is located in close proximity to the site and their drinking water is supplied by privately owned groundwater wells. In response to this concern, EPA sampled a representative number of private drinking water wells within the community. The sampling results did not show contamination to be present.

Prior to initiating any field activities, EPA and IDEM distributed a "kick-off" fact sheet and held a Remedial Investigation (RI) "kick-off" meeting. The primary purpose of the fact sheet and meeting was to provide the community with information on the Superfund program, the site's history, and the activities planned for the RI phase of the project. During the RI the following activities were conducted to provide community involvement in the RI/FS process:

- Distribution of Fact Sheet No. 1 explaining the results of the initial field investigations and the subsequent field investigations necessary to characterize the site
- Distribution of Fact Sheet No. 2 explaining the results of the subsequent field investigations and the FS phase of the project
- Conductance of a public availability session to answer questions on the RI report

- Placement of a newspaper ad announcing the availability of the FS and Proposed Plan and the date of the public meeting
- Distribution of a Fact Sheet summarizing the FS and Proposed Plan
- Conductance of a public meeting to present the FS and Proposed Plan as well as receive public comment

Approximately 40 people attended the public.meeting on the FS and Proposed Plan. Several questions were asked at the meeting and the oral response to each of these questions is provided in the official meeting transcript. In addition, two formal comments were received during the meeting, both from local interest groups. Five formal written comments were received during the public comment period: three from area residents, one from a potentially responsible party (PRP), and one from a group of PRPs.

III. SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

The comments received during the public meeting and public comment period are divided into the following sections:

- Remedial Investigation
- Feasibility Study
- Preferred Alternative
- Regulatory Issues
- PRP Alternative Proposal

REMEDIAL INVESTIGATION

Comment #1:

The report, in purporting to pinpoint the site history, contaminant sources, contaminant transport routes, exposure pathways and public health endangerment, does not adequately investigate and report on all potential responsible parties, including generators at the site nor does it adequately address the historic use of the river front land upstream and downstream of the site as a long-time widely used dumping ground.

Comment #2:

Although the report mentions contiguous properties, including Dager Auto Parts junkyard and Martin's Landfill, no data was gathered or analyzed to characterize the contribution of these obviously contaminated properties to contamination at or around the site nor was there an evaluation of the historic aerial photographs of these historic sources of contamination.

Comment #3:

Although only limited off-site sampling (upriver and upgradient) was done, it is significant to note that some "background" samples for lead, antimony, and arsenic were higher than concentrations detected on site. This data, even though not part of a comprehensive analysis of likely offsite sources of contamination, supports previous comments about other likely sources of contamination. More thorough off-site and upriver, upgradient investigation should be done to more completely define those sources of contamination that might otherwise be attributed to the Fort Wayne Reduction site.

EPA Response:

The response to these comments is divided into the following sections:

- Potentially Responsible Party (PRPs)--Investigation and Identification
- Remedial Investigation (RI) Report--Area Around the Site

Potentially Responsible Party--Investigation and Identification

The primary objective of the RI was to gather and evaluate that data necessary to:

- Define the nature and extent of site contamination sources and the potential routes of contaminant release and migration
- Quantify the potential impact and risks to human health and the environment from the presence of or release of contaminants from the site
- Define remedial measures that reduce the risk or threat posed by the presence of or release of contaminants from the site
- Support the Feasibility Study (FS)

The RI report merely summarizes the technical findings of the RI. The investigation and identification of all PRPs is not a RI objective. Therefore, this type of information is not required to be in the RI report.

The investigation and identification of PRPs is, however, very important to the enforcement activities at a site. The Agency did perform an investigation and identification of PRPs as a separate activity outside the RI/FS. The investigation of PRPs was accomplished by gathering as much information as possible on those parties linked to the site. This information included but was not limited to: knowledge regarding use of the site, knowledge on site operations, knowledge and documentation on the types and chemical composition of wastes generated by a party both in the past and the present, as well as information leading to the discovery of additional PRPs. From the information available, EPA identified the PRPs for the site. The investigation and identification of PRPs is an ongoing process, as new information becomes available EPA will continue to identify PRPs for the site.

Remedial Investigation Report--Area Around the Site

As stated above, the RI had specific objectives, and the RI report merely summarizes those findings. It was not the objective of the RI to perform an investigation on "the historic use of river front land upstream and downstream of the site as long-time widely used dumping ground." This type of investigation would require development of an area-wide program. Superfund cannot conduct "area-wide" investigations unless such area is on the National Priorities List (NPL). For this particular area along the Maumee River, only the Fort Wayne Reduction site is on the NPL.

Although elaborate investigations of the "area around the site" were not included in the RI, the Agency did consider the historic use of the area when developing the RI workplan. To ensure a proper evaluation of the RI data and subsequent identification of risk directly associated with the site, the collection of numerous background samples was planned and executed during the RI.

Although the commentor makes specific reference to elevated levels of lead, antimony and arsenic in upriver and off-site sediment and surface soil samples, respectively, the following should be noted:

- It is true that due to upstream sources, it is very difficult to determine the site's contribution to sediment contamination. EPA thus focused the remedial goals on limiting the site's contribution to the river. (See Comment #9)

- While it is true that off-site surface soil samples for some locations show higher contaminant levels than those on-site, the focus of the selected remedy is not on surface soil contamination. EPA identified only a relatively small area on-site where a direct contact with the surface soils is a concern. This area is the wire disposal area where no cover existed and wastes were exposed. The main concern at the site is the groundwater contamination and buried drums in the western portion of the site. Based on groundwater quality in the off-site upgradient monitoring wells as compared to groundwater quality in the monitoring wells directly downgradient of this waste area, groundwater contamination is clearly due to the on-site wastes.

Based on the conclusions reached by EPA regarding the commentor's points, it is apparent that "background" conditions were taken into consideration prior to reaching any conclusions regarding on-site and off-site contamination.

Comment #4:

Excavation procedures used at test pit locations during the RI appear to have caused release of contaminants to the site. Technical Memorandum 10 explains that if intact drums were punctured during excavation, released materials were not removed. The pits were simply filled in with the leaking drum caused by EPA's contractors and allowed to remain in the ground.

EPA Response:

Test pit excavation ceased when a drum was encountered. The test pit was then backfilled with the excavated soil. If test pit excavation procedures resulted in a leak or a spill from a drum, the spill was dry-packed with an application of absorbent material prior to backfilling the test pit with soil. In addition, absorbent material was applied to any previously leaking drum uncovered by the test pit investigation. The use of absorbent material was recommended to EPA by Waste Management, Inc. prior to work initiation.

Comment #5:

The RI gathered very little upgradient groundwater data. Due to the limited number of upgradient monitoring wells, it is not possible to confidently assess contribution of likely upgradient contaminant sources to groundwater contamination on site.

EPA Response:

While planning the RI, EPA utilized a contractor with years of both practical and field experience in hydrogeological investigations. Prior to initiating work, EPA performed a thorough review of all proposed groundwater monitoring well locations as well as the number of groundwater monitoring wells to be installed. In addition, a thorough review was performed by IDEM. The Agency believes the number of upgradient groundwater monitoring wells and the areal coverage provided by their locations was sufficient to assess if any upgradient sources were contributing to the groundwater contamination at the site.

The RI data also confirms EPA's conclusion that the number and location of upgradient wells was sufficient. The RI indicates groundwater contamination to be primarily downgradient of the former pit area. The well located directly upgradient from the former pit area was not contaminated. Subsequently, EPA's conclusion that groundwater contamination is due to the site rather than an upgradient source is not unfounded. In addition, the test pit data indicating the presence of drummed liquid wastes and contaminated soils upgradient from the contaminated groundwater monitoring wells, further supports EPA's conclusion.

Comment #6:

While mention is made of a planned Corp of Engineers flood control project, no information is present on its impact on the site, nor is any COE data reviewed. Since any dredging or alteration of the Maumee River near the site would have potentially significant impact on the site, information on the COE project must be considered before a Feasibility Study Report can be made.

EPA Response:

During the Feasibility Study, the Army Corp of Engineers (COE) was contacted regarding their future plans on the Maumee River. A copy of the COE flood control feasibility study was obtained and reviewed. In addition, EPA worked closely with the COE when evaluating the various options for site remediation.

Comments #7:

No explanation is offered on the significance of laboratory analytical results reflecting false positive results in field blanks and laboratory blanks.

EPA Response:

Each Technical memorandum (RI Report - Vol. 2) presented a summary table of any data obtained during a particular field investigation. The data may have been notated with the following qualifiers:

- B indicating that the compound was present in the laboratory method blank or in the trip field blank.
- J indicating an estimated value less than instrument detection limit, or greater than instrument detection limit but less than the contract required detection limit.

The use of these qualifiers indicates the significance of false positive results (i.e. field and laboratory blank contamination) within a particular data set.

FEASIBILITY STUDY

Comment #8:

Claims were made that sediment were untraceable because the river has been regularly dredged, yet the river has never been dredged.

EPA Response:

The RI incorrectly stated that this reach of the Maumee River had been dredged. The statement was based on observations made during the field investigation. Piles of what appeared to be river dredgings were noticable along the bank of the river. Subsequent conversation with the COE confirmed that the river has not been dredged.

The conclusion that sediments were untraceable because the river was regularly dredged was not made in either the RI or the FS reports. There is no correlation between these two points. Sediments were not traceable to the site due to a number of factors. These were discussed in detail in Appendix G of the FS report.

Comment #9:

It was also indicated that the topographic relief varied, implying the river was fast and sped sediments away, yet this area of the river is probably the most sluggish and sediments would settle rapidly. Any contaminated sediments downstream from Fort Wayne Reduction site are candidates for removal.

EPA Response:

The Maumee River is a shallow, flat-bottomed, meandering river, typical of the Midwest. In general, sediment load in the river consists of two parts: bed load and suspended load. Bed load is supported by grain to grain contact and suspended load is supported by the column of fluid. At low flow rates, the suspended load more readily settles to the bottom to become part of this bed load. During storm events, velocity increases and sediments from the bed load are lifted and transported. Larger grained soils may remain on the river bottom and slide over one another in the direction of flow. Thus, sediment transport is variable.

Sediment sampling performed during the RI indicated little bed load adjacent to the Fort Wayne Reduction site. Sediments were generally less than 6 inches thick, and were absent in some locations (see Technical Memorandum No. 12, RI Report). Most sediment samples collected were a fine sand with some silt. Another sediment sampling study (Maumee River Bed and Embayment Sampling, ATEC, January 1988) reported that river sediments were either gravel or sand. These data suggest that bed load in the Maumee River is mostly sand and gravel, and that net deposition of fine-grained materials along the Fort Wayne Reduction site is not occurring.

EPA believes sediment contamination in the Maumee River is not associated with the Fort Wayne Reduction site alone. The data do not identify a discernable impact directly associated with the releases from the site.

Comment #10:

It was stated the EPA couldn't use the Army Corps of Engineers sediment study. Why not?

EPA Response:

The COE data were used in the FS and can be found in Appendix G. The data were used for comparison purposes only. The differences in sampling methodology and analytical methods as well as the seasonal variation of the sampling events precluded combining these data sets.

Comment #11:

Tests showed positive PCB contamination in the aforementioned area, warranting the presently effective fish advisory extending from the Ohio state line to Fort Wayne, Indiana. If this contamination is not coming from the Fort Wayne Reduction site, then where is its source? And no matter what the source, isn't the EPA responsible for pinpointing cleanup?

EPA Response:

Although PCB contamination was found to be intermittently present in the Maumee River sediments near the Fort Wayne Reduction site, PCB contamination was present in Maumee River sediments upstream from the site at levels equal to or exceeding the levels near the site. This indicates that PCB contamination in the Maumee River sediments is a result of several different potential sources.

The Agency agrees that implementation of a comprehensive (area wide) program to investigate contamination in the Maumee River sediments and the various potential sources contributing to the problem is needed. However, an area-wide program cannot be conducted under U.S. EPA's Superfund remedial program. The Superfund program is limited to investigating those sites on the National Priorities List (NPL), like the Fort Wayne Reduction site. For this reason, the RI had to be limited to investigating and identifying only those discernable impacts directly associated with the releases from the Fort Wayne Reduction site.

Comment #12:

Two points were raised about the activities along the Maumee River and the use of the water for drinking purposes by the surrounding communities. The consumption of fish contaminated with PCBs which are known to bioaccumulate and the inability of the normal filtration process for drinking water to remove PCBs are leaving the communities at risk through these identifiable pathways of exposure to the contaminants being discharged from the Fort Wayne Reduction site.

EPA Response:

The current data indicates that the concentrations of PCBs in the river are below drinking water criteria at this time. In addition, the risk assessment indicates that recreational use of the river, such as swimming and fishing, would not pose a risk to human health. These conclusions are however based on the estimated river concentrations (see RI Report Vol. 2 - Technical Memorandum #11) during mean and low river flow conditions.

The presence of PCBs in the sediments can serve as a contaminant source especially to aquatic organisms. Sediments contaminated with PCBs were present upstream as well as near the site. The PCB levels upstream from the site were equal to or exceeding the PCB levels near the site. This indicates that PCB contamination in the Maumee River sediments is a result of several different sources and not just the Fort Wayne Reduction site. Although EPA can implement a site cleanup that prevents the Fort Wayne Reduction site from contributing contaminants into the river at unacceptable levels, EPA's Superfund program can not address the other potential sources until they are included on the NPL. It should be noted however, that even if EPA could address all of the potential sources, the fish and other aquatic organisms can not be "remediated". Therefore, EPA encourages people to observe any fish advisory in effect.

Comment #13:

A request was made to reevaluate the river sediments and take action to remove the contaminated sediments from the Maumee River.

EPA Response:

An evaluation of the Maumee River sediments was presented in Appendix G of the FS. The commentor is referred to this appendix for detailed information of the Agency's evaluation and conclusions. The Agency believes the evaluation was performed properly and a reevaluation of the Maumee River sediments is not warranted. As a result the conclusions drawn by the Agency remain valid and Maumee River sediment removal will not be included as part of the remedial action.

Comment #14:

A request was made to consider using soil from a source along the river that is currently being excavated as a part of the Maumee River Basin Commission activity for use in the soil cover.

EPA Response:

Grain size distribution curves for soil samples received from the Maumee River and the north embankment were reviewed (re. Embankment Sampling, ATEC project number 21-75039, January 1988) . Samples were taken at cross sections corresponding to river mile (RM) 131.0, 132.0, 132.74, 133.7 and 134.95. The Fort Wayne Reduction site is on the south river bank at river mile 132.7. All samples obtained from the river were either sand or gravel.These materials would not be suitable for the soil cover. Three soil samples obtained from the north river bank (at RM 132.74, 132.0, and 131.0) are classified as ML (low plasticity silt). These samples were collected from 1 to 2 feet below ground surface, and were described in the soil report as containing "large amounts" of organic material. Although the ML soil is suitable for the soil cover, it should be free of organic material. Since the samples were obtained near the ground surface, the organic material was probably roots from surface vegetation. Deeper samples would need to be collected and analyzed to confirm the depth of the silt deposit and determine whether the organic material is associated with surface vegetation. If this is the case, surface could be stripped and the underlying soil stockpiled as a potential cover material source for the Fort Wayne Reduction site.

Comment #15:

Several comments were received that addressed the issue of a complete cleanup. The concern centered around the regular flooding of the Maumee River and spreading contaminants during a flood event.

EPA Response:

The purpose of the Feasibility Study is to weigh and balance the reduction of risk and the costs of the various cleanup technologies. Often a complete cleanup requires the removal of the landfill to another location. During the initial FS screening, it was determined that undertaking this type of an action at the Fort Wayne Reduction site would be excessively high in cost. There currently is a lack of capacity in RCRA landfills to handle this volume and there is a risk associated with transporting the contaminated soil over public roads. For these reasons, none of the alternatives developed for the Fort Wayne Reduction site would result in complete cleanup. The alternatives were developed to achieve a reduction in risk. We have chosen Alternative 4C because it provides adequate reduction in risk at an acceptable cost.

The design criteria for the soil cover will specify flood protection as a major component. EPA believes adequate sloping and revegetation of the landfill will protect against wash out of the contaminants during a flooding event and reduce the risk of contaminants spreading downstream.

PREFERRED ALTERNATIVE

Comment #16:

It is understandable that 4C would be recommended by EPA because it will take care of the major portion of the hazardous waste. The problem with that alternative is that not only is toxic ash from the incineration going to be placed in the ground, but the soil which is contaminated will stay there also. I recommend that alternative 5C be selected so that the site will be more thoroughly cleaned up.

EPA Response:

The incineration of the drummed liquids could take place off-site. If this were the case, the ash would not be returned to the site. The contaminated soil would be returned to the excavation and a soil cover installed. If incineration occurs on-site the buried ash would be covered by a RCRA type cap providing maximum protection from infiltration and providing for reduced mobility of the inorganics in the ash.

In either situation, the collection trench will ensure protection of the river should any contaminants migrate to the groundwater and move towards the river. The soil cover or RCRA type cap will prevent any direct contact with the contaminated soils or incinerator ash.

Selection of alternative 5C does provide a greater degree of cleanup but at a substantially greater cost than alternative 4C. For this additional cost there is not a proportionally greater reduction in risk to the environment. Although a complete reduction of the organic compounds in the soils would be accomplished through incineration, the potentially toxic ash would be buried on site and still require the collection of groundwater for an undetermined length of time.

If the ash was transported off-site to a RCRA facility, the management and potential problems associated with the ash is merely being moved to another location. In addition, transportation of the ash to a RCRA facility would make the cost of Alternative 5C even higher. As Alternative 5C provides for the incineration of drums, soil and wastes only from the western portion of the site, all wastes in the eastern portion of the site would remain in-place. With these wastes remaining in-place, a long-term management program would still be necessary at the site even if the ash was transported to an off-site RCRA facility. For these reasons, a decision was made during the FS that Alternative 5C is best configured with the ash remaining on-site.

Comment #17:

I feel alternative 5B should be considered. I also feel the estimated total cost for alternative 5B is an inflated figure. I believe 5B should be studied more closely and the cost estimate adjusted down to a more realistic figure. I also believe the estimated time to complete 5B should be revised downward.

EPA Response:

The cost estimate for figure 5B, like all the other alternatives, is an order of magnitude estimate. This means the cost estimate can vary from +50% to -30% in accuracy. This type of cost estimate is typical for a Feasibility Study. It is assumed that when you refer to this estimate as being inflated you are comparing this to a normal construction of a collection trench and slurry wall and standard excavation practices. Some components contributing to the higher cost estimate for Alternative 5B are the health and safety considerations for working in contaminated soil, the uncertainty associated with the number of buried drums and the scheduling of excavation and incineration around flood prone months. When working in contaminated soils, the workers must be protected. Based on the field investigation data, we estimated that a good portion of the work will be done under level B and C protection. The uncertainty associated with the number of buried drums and the extent of soil contamination is a result of estimating these quantities from the test pit data collected during the field investigations. Therefore, a conservative estimate was made on the number of buried drums in order to develop the cost estimate.

The length of time required to complete 5B is based on several factors. In the design process we have allowed for adequate review time by other government agencies, in particular the Army Corp of Engineers. Another impact on the schedule is the timing of the excavation and the incineration. The excavation would proceed faster than the incineration so several mobilizations and demobilizations would be required during the remedial action. The schedule also accounts for the potential slow down of work during the flood prone months.

Selection of Alternative 5B would have provided a greater degree of cleanup but at a substantially greater cost than Alternative 4C. For this additional cost Alternative 5B does not provide for a proportionally greater reduction in risk to the environment. Although a complete reduction of the organic compounds in the soils would be accomplished through incineration, the potentially toxic ash would be buried on-site and still require the collection of groundwater for an undetermined length of time.

Potentially Responsible Party (PRP) Alternative Proposal

Comment #18:

The first pathway of exposure as indicated by the risk assessment is direct contact from the waste materials. Direct contact with the waste or leachate would be limited because of the odor and bad taste of the waste and leachate and could be prevented by a fence and soil cover.

EPA Response:

A soil cover will prevent direct contact with the waste but will not prevent direct contact with the "leachate". As a point of clarification the leachate is actually groundwater discharging or seeping out at the surface rather than landfill leachate. The taste and odor of the groundwater seeps would not necessarily discourage a one-time exposure, while the exposed soil in the wire disposal area would not necessarily have a taste or odor. Fencing the site would not eliminate groundwater seep contact unless the fence extends into the river. This is not being considered as it is impractical.

Comment #19:

The second pathway of exposure as indicated in the risk assessment is groundwater migration to the river. EPA's own findings state that current releases are "order of magnitude lower than levels required to pose a risk to human health through incidental ingestion or ingestion of fish".

EPA Response

The quote refers to statements made on page 5-6 of the RI and B-23 of the appendix. We were specifically addressing the potential human exposure to contaminants in the river, from fish ingestion and swimming in these sections of the report. We were not addressing at this point the potential aquatic impacts from the site. The quotation is misleading when taken out of context.

Comment #20:

It appears from the text of the RI/FS reports that the ground water collection and barrier system is required because of perceived present and future risk of increased discharge to the river from leaking drums of liquid waste. Once the EPA decided to remove these drums from the site, then certainly this perceived risk of additional groundwater discharge is likewise removed; however this risk reduction does not appear to be fully considered in the FS selection process. Removing the drums containing liquid waste removes the risk of future increased discharge and thus removes the primary basis upon which the Alternative 2 groundwater collection system is based.

EPA Response:

The risk assessment indicates the existing groundwater and groundwater seep contaminant levels in relation to their impacts on aquatic life are a concern. The presence of the drums and contaminated soil may represent a source of loading in the future, possibly at levels greater than currently detected. Removing the drums containing liquid waste does not remove the risk of an increased discharge of contaminated groundwater into the river. The drum removal will reduce this risk but not eliminate it. A risk may still be present from contaminated soil reconsolidated on-site after excavating and removing the drums. These soils may leach contaminants to the groundwater. Although the reconsolidated soils may leach contaminants to the groundwater, the only other options for these soils is treatment or transportation to a off-site RCRA facility. Transportation to a RCRA facility would only transfer the problem to another location. Treatment could be provided; however, due to the types of contaminants present , incineration is the most viable treatment option. Incineration of the soils was included in Alternative 5. A discussion of why Alternative 5 was not selected can be found in EPA's response to comments #16 and #17. As a result, the groundwater collection system is required to prevent any groundwater from discharging into the river.

Comment #21:

The only remaining question relates to preventing any future migration of the site groundwater to the river. The mixing zone was expressed as an area of concern. We agree that to calculate the size of this zone is impractical; however to test for it (through sampling and analysis) is not. The EPA collected river water samples adjacent to the river banks which showed no contamination. Considering the minimal groundwater discharge to the river, no significant mixing zone would be expected. It is clear from the EPA study that current and future discharges will pose no health or significant environmental impact to the river.

EPA Response:

It cannot be concluded that current and future discharges will pose no health threat or significant environmental impact to the river based on the information presented by the commentor. The levels of contaminants in the groundwater and groundwater seeps suggest an adverse aquatic impacts exists even though the area of impact may not be a large area.

As a point of clarification the EPA did not collect river water samples at any time during the RI. Adverse acute impacts in the river were assessed on the quality of groundwater and groundwater seeps at the point of discharge into the river. Adverse chronic impacts in the river were assessed on the estimated river concentrations outside a mixing zone during mean and low river flow conditions. Estimated river concentrations were calculated from the quality of groundwater and groundwater seeps discharging into the river. The commentor can find a detailed explanation of the methodology used in the RI Report Vol. 2 - Technical Memorandum #11.

Comment #22:

The contamination levels in the groundwater and any impact to the river will be closely monitored by the post-construction monitoring program. The completeness of all aspects of this remedial construction will be periodically reassessed as part of the monitoring program. Thus, the mechanism is already in place to check for and address "threats of release". Should unacceptable discharges occur in the future, which is very unlikely once the majority of the drums are removed, then specific groundwater collection and treatment system can be designed.

EPA Response:

The purpose of the groundwater collection system is to prevent the discharge of contaminated groundwater into the Maumee River. The groundwater contaminant levels measured during the RI were exceeding the acute water quality standards for the protection of aquatic organisms at the point of discharge into the Maumee River. Removal of the drums from the site will not change this fact. Therefore the groundwater collection system is necessary to prevent the release of contaminants at unacceptable levels into the river.

Comments #23:

We believe more credit should be given to the existing clay cap on the eastern portion of the site, thus reducing the amount of additional fill required.

EPA Response:

The soil cover as described in the FS for the eastern portion of the site meets the State of Indiana regulations for Subtitle D closure of a solid waste disposal site. The approach taken in the feasibility study (i.e. 18" of soil and 6" of topsoil) was conservative for cost-estimating purposes. After the site is regraded, two requirements need to be met:

- The cover must be 2-feet thick
- The soil must meet specified classifications

It must be adequately demonstrated that these requirements are met after regrading the site, or additional cover material will be required to meet the regulations.

Comment #24:

A total 2- to 3-foot thick top cover has been a standard top cover for sanitary landfills in Indiana, a 2-foot thick clay cap, topped by 6-inches of topsoil is currently required by Indiana Solid Waste regulations. Due to the lack of health or environmental impact from this portion of the site, we see no need to depart from this standard. In Attachment B, our evaluation of water balance calculations contained in technical Memorandum No. 7 shows that there is very little if any infiltration reduction to be gained by increasing the top cover thickness. Further, the slopes are relatively gentle and additional erosion protection will be installed along the side slopes. Thus, the expected soil loss due to erosion is minimal.

EPA Response:

The main reason for selecting a soil cover for the eastern portion of the site was to prevent direct contact with and washout of the buried waste. In addition, surface infiltration will be reduced and compliance with the State Subtitle D - solid waste landfill closure requirements will be achieved.

The erosion control plan for the site is a maximum 1 (vertical) to 3 (horizontal) slope and a polypropylene mesh stapled into the embankment to hold soil in place until vegetation is established. At present, the slopes adjacent to the municipal landfill are 1 (vertical) to 5 (horizontal) or less, which meets the grading requirement. The slopes are poorly vegetated in some areas and erosion gullies were observed during the RI. The erosion control plan will eliminate such erosion gullies, and continued site inspection and maintenance will assure erosion does not occur in the future.

Comment #25:

Based upon our review of the RI/FS, we did not find any other direct calculation or specific reasoning to justify a thicker cover. We therefore recommend that once the site is regraded that the existing thickness of the top cover be confirmed on a grid pattern and additional fill be added as needed to achieve a total 3-foot thickness, which is 6 inches more than required to account for thickness variations between probe checks.

EPA Response:

During the remedial investigation field work, the cover was probed on a grid (100 ft X 100 ft). The cover thickness ranged from 4 to 24 inches with an average thickness of 17 inches based on 36 samples. We did not specify that a new cover was required for the eastern portion of the site, but only that the final cover meet Indiana Subtitle D closure requirements for a solid waste landfill. Therefore, EPA considers the commentor's proposal to be a technically acceptable approach to completing the final cover on the eastern portion of the site.

Comment #26:

Exploring for buried drums is a very difficult process, involving balancing the need for accurate information versus minimizing site disruption during the exploration phase, when equipment resources are limited. The amount of information gained at this site will make it difficult to obtain an accurate construction bid to perform the drum excavation and handling work. It will be difficult to establish a drum handling protocol, particularly a demarcation between crushed drums which stay in place, and intact drums, containing liquid waste, which must be removed for off-site treatment or incineration. This additional information is important as drum excavation and disposal represents a large percentage of the estimated cost to complete the project.

We believe a more selective approach should be taken with a respect to drum excavation, realizing that isolated drums will not have a significant impact on the river water. This selective approach would concentrate on exploring for substantial "pockets" of drummed liquid waste, and not performing extensive excavations looking for a few isolated drums.

A physical probing program should be developed during the design phase. Based on the site conditions it is likely this probing could extend at least four feet into the waste materials. Excavation across the site could proceed in four foot lifts with the probing proceeding backhoe excavation. Once the bottom 4-foot lift was reached, further vertical excavation would proceed only if metallic contact was made. This probing would reduce the chance for drum rupture by the backhoe and reduce the extent of required excavation.

EPA Response:

The areas delineated as containing drums and the estimated number of drums present was based on the test pit data. The procedure used to estimate the numbers of drums on-site involved extrapolating information from several pits over an entire area (see Appendix B of the FS Report). It is likely that some areas have concentrated numbers of drums (e.g. the barrel pit area), and a probing program may be useful in identifying these areas. However, physical probing is not a viable method for this site. This is due to the following factors:

- The need for very close probing spacings to ensure drums would not be missed.
- The inability of physical probing to differentiate between concrete and drums. This particular site has construction rubble and debris scattered throughout the excavation area.

It might be possible to use a vertical gradient magnetometer survey at close grid spacing (i.e. 10 feet) to identify areas of buried metal. These areas would be excavated and drums removed; metal would also be removed. Another magnetometer survey would be conducted and areas showing anomalies would be excavated. This iterative process would occur until it was demonstrated that no magnetic anomalies exist within the excavation area.

Comment #27:

The EPA's findings indicate there is not current health or environmental harm resulting from the ground water discharge. We believe that the threat of any such future harm will be removed when the drums are removed. Further, the EPA has found that Area A is providing the majority of the contaminant loading to the river, even though it is insignificant (Technical Memo No. 11, Table 6A, and Figure 3). Therefore, it is our opinion that drum removal, soil cover, and fencing satisfy the remediation criteria (ARAR) and no further ground-water collection and treatment is warranted at this time. In fact, construction of EPA's proposed collection and barrier trenches will adversely impact the site physically will delay construction, and will reduce future options at this site.

EPA Response:

The RI findings indicate there is a threat to the environment from contaminated groundwater discharging into the river. Removing the drums from the site may reduce this risk but does not eliminate the potential risk associated with the contaminated soil replaced after excavation. Therefore, collection of the contaminated groundwater will be necessary to ensure protection of the river. Groundwater collection would have to continue until it was demonstrated that a "natural" groundwater discharge would be protective of the river.

Construction of the collection trench and barrier wall will not adversely impact the site. As a part of the remedial action, the area will be revegetated and the slopes stabilized for flood protection. This action, although adding to the length of time for construction, is required to be protective of the environment, and in no way reduces future options at the site.

Comment #28:

In order to evaluate the effect of contaminant loading reductions which would result from drum removal, a site-specific contaminant transport model was used. Results of our modeling effort show that once contaminant loading is reduced or eliminated, contaminant concentrations in the aquifer will attenuate fairly quickly rather than become worse with time.

EPA Response:

The conclusion of the commentor's contaminant transport model is that "once contaminant loading is reduced or eliminated, contaminant concentrations in the aquifer will attenuate fairly quickly." This conclusion is questionable for the following reasons:

1. Alternative (4C) does not eliminate the entire contaminant source by drum excavation and removal. Drum excavation eliminates drum rupture (assuming that all drums are found), reducing further soil and groundwater contamination. Contaminated soil is still redeposited on-site and will remain a potential source.

2. The use of the model is questionable due to both the lack of explanation given for some chosen assumptions and the inappropriateness of some assumptions used in running the model. The specific problems and questions with the use of the model are as follows:

   - The use of a constant aquifer thickness of seven feet may not be appropriate. The aquifer material and the saturated thickness varies from approximately 5 feet to 10 feet on the northern boundary of the western portion of the site (See Figure 2, Technical Memorandum 7). Both groundwater discharge and contaminant loading calculations presented in the remedial investigation report (Technical Memoranda 7 and 11) allowed for these variations by choosing individual saturated thicknesses for each flow tube.

   - The use of a 1.6 percent south to north slope chosen for both the groundwater surface and the confining layer surface is not explained.

   - Attachment C, paragraph 2, states that chloride and TCE were modeled "using randomly distributed concentrations of each constituent across the site immediately following the removal of the contaminant source." Once again, contaminated soil is not removed under implementation of alternative 4C. The modeler does not state the basis for assuming that the "randomly distributed concentrations" are representative of concentrations left in the soil after drum removal.

   - Attachment C did not provide an explanation or basis for how the following model assumptions were arrived at:

     - "Number of particles"

     - Retardation coefficient calculations are not included. The organic carbon content and bulk density of the materials from which the retardation coefficients were calculated are not included. A Rc of 2.0 for TCE is too small for the flood plain soils of the surficial aquifer at Fort Wayne.

A larger retardation coefficient for TCE will cause an even longer attenuation than 100 years.

- Initial average areal concentration for chloride and TCE dispersivity: Current modeling techniques almost universally make transverse dispersivity 1/20 of longitudinal dispersivity. A transverse dispersivity of 17 is too large compared to the longitudinal dispersivity given of 37 feet. A smaller transverse dispersivity will increase attenuation time greatly. The source or explanation for both of these numbers is not given.

- "Uniformly random but average value" for initial vertically mixed concentrations" for chloride and TCE.

- Linear equilibrium isotherm adsorption for TCE.

Comment #29:

We recognize and appreciate the goal of achieving a "walk away" remediation. Because of the proposed soil cover and drum removal operation, we believe that this goal will be achieved at this site, without the need for ground water collection and barrier system. At worst, should subsequent monitoring show that these ground water systems are required, they could then be installed, resulting in a phased approach. This phased approach of addressing ground water after contaminant source removal has been standard operating procedure on CERCLA sites, such as Conservation Chemical of Illinois, CAM-OR, and Seymour, to name a few local examples.

EPA Response:

The soil cover and drum removal will not be protective of the environment without the groundwater-collection system. If after an interim period of collection and treatment groundwater meets discharge criteria then a monitoring of the collected groundwater would be acceptable.

The phased approach implemented at the Seymour site resulted from a need to perform an emergency removal action to eliminate the direct contact threat at the site. The soil was removed over 75 percent of the site to 1 foot depth. Fifty-five thousand drums and 1,000 bulk tanks were also removed. The extraction wells were installed to clean up and control groundwater until further action could be taken.

Obviously, the objective of this phased approach was to address the more serious risks posed by the site while an investigation of the long-term risks was conducted. The RI at the Fort Wayne Reduction site identified all of the risks associated with the site based on the information available. The FS subsequently identified the ways in which those risks could be addressed. The selected Alternative 4C contains only those components necessary to comply with SARA and ensure protection of human health and the environment. Implementing anything less than Alternative 4C would compromise the protection Alternative 4C provides to human health and the environment. For these reasons, EPA believes a phased approach of the remedy is not appropriate for this site.

Comment #30:

Although not required by the risk assessment and the ARAR's presented in the FS report, we do believe it would be advisable during excavation and drum removal in Area A to construct a sump(s) and pump off the more contaminated ground water. This will significantly hasten the attenuation process. We estimate about 50,000 gallons can be effectively withdrawn during the construction process. Further ground water collection is not warranted at this time.

EPA Response:

Alternative 4C does not call for any excavation below the water table and groundwater extraction should not be necessary. It has not been demonstrated that a 50,000 gallon groundwater extraction well will clean up all contaminated groundwater at the site, or how the one time extraction of groundwater in the excavated region will clean up the future releases by replaced contaminated soil.

Comment #31:

In order to construct a slurry wall and interceptor trench along the northern boundary of the site, along the flood plain, it will be necessary to construct a level berm, at least twenty feet wide to facilitate construction. The slurry wall construction procedure recommended in the FS includes bulldozer mixing of the slurry. This requires a minimum horizontal berm width, alongside the trench, of 25 feet, and preferably 50 feet. This will require either substantial filling of the flood plain and/or removal of the trees along the river bank. Also, this will impact the existing wetlands as shown in Attachment D. Removal of those trees would significantly reduce the capacity of the site to withstand flooding and would promote erosion of the site. Note that during the 1982 flood, almost the entire site was underwater.

The slurry trench and interceptor trenches must extend through waste. The observed character of waste at this site can make excavation very difficult and the variable porosity and pore size may make it impossible to develop the required filter cake for slurry wall construction. In addition, constructing the slurry wall would preclude recharge from the river. This recharge from the river has the beneficial effect of "flushing" the soils between the trench and the river.

EPA Response:

In the feasibility study, it was assumed that a 30 foot wide, level alignment would be necessary for slurry wall construction. Some cut and fill construction will be needed to prepare the site, especially just north of the former barrel pit area. However, the overlap quantities for regrading are not estimated to be "substantial" (1100 cy estimated). Trees will be removed and tree roots grubbed to allow the trench to be installed. Impacts to the wetlands will be minimized using erosion controls and scheduling construction at low flood frequency time periods (see "Flood Control and Wetlands," Chapter 4 of FS Report). Trees will be removed only along the slurry wall path, not between the slurry wall and the river. The remaining trees will provide erosion stability along the river bank. Following construction (estimated to take 2 to 4 months), the area will be immediately revegetated and stabilized with polypropylene matting. Construction could be staged so that all work in a given area is completed and the area reseeded before progressive grading and trenching.

Neither the slurry trench or groundwater collection trench will be placed through areas of waste.

The primary purpose of the slurry wall is to prevent recharge from the river and any dilution effect river recharge may have on the collected groundwater, as dilution is not considered an acceptable form of treatment.

Comments #32:

The proposed interceptor trench construction procedure utilizing a biodegradable slurry is very new technology. Insufficient data is presented to judge its feasibility, particularly since it will extend through waste. A significant concern is that obstructions in the waste will likely be encountered such as drum, timber, and rubble which were prevalent in the test pit excavations. Slurry trenching procedures cannot effectively penetrate such obstructions and typical standard open hole excavation techniques must be utilized to remove the obstructions. Considering an average depth of excavation of 15 to 20 feet and 1:1 side slopes for OSHA trench safety considerations, the top width of such an excavation would be at least 30 feet wide. Considering the steep slopes and wooded vegetation along the trench alignments, such an excavation would be very difficult and disruptive.

EPA Response:

Use of a biodegradable slurry trench was proposed for installing the groundwater collection trenches because no dewatering or shoring costs are incurred and personnel do not have to enter the trench. This method was used successfully in California to contain a diesel fuel spill; the collection trench was placed to a depth of 50 feet. Additional testing is needed at this site during the Remedial Design phase to ensure compatibility between the slurry and the waste stream. If an adequate slurry cannot be designed, then a more conventional type of construction (e.g. shoring or trench box) would be needed.

Comment #33:

If ground water purging were necessary we would agree that either an interceptor trench or well points would be the design of choice. However, either system would provide a sufficient cutoff and a barrier wall would not be necessary. Our calculations, presented in Attachment B, indicate a radius of influence of about 50 feet for the trench and this the amount of recharge from the river could be reduced as desired, by moving the wall away from the river.

Considering site-specific constraints on trench construction, we believe well points are more appropriate at this site. Such wells can be located to pump from specific areas and can be located far enough from the river to reduce its recharge impact. In fact, by suitable well location, recharge from the river may be encouraged for its beneficial "flushing" impact.

The hydrogeologic conditions are conducive to well point construction since the upper soils are permeable and the ground water level is less than 25 feet deep. It is true, as the EPA states, that the amount of water pumped will be limited by the saturated thickness of the aquifer. However, the saturated thickness at this site is well within standard operating well point range. Calculations presented in Attachment B indicate an expected pumping rate of 0.008 gpm per lineal foot of pumping which is very similar to the proposed trench. Well point construction is far less disruptive than the proposed interceptor trench construction. It will not require filling the flood plain, destruction of the wooded bank and wetlands, and will allow pumping not only along the bank, but also from suspected centers of contamination.

While we do not believe such a ground water pump and treat program is necessary, the trench and well point options remain viable should future conditions warrant.

EPA Response:

The comment states that a 50 feet radius of influence was calculated for the collection trench and the amount of recharge from the river could be reduced, as desired, by moving the wall away from the river and that a barrier wall would not be necessary. Although the commentor's statement is generally true, the statement does not take into account several site specific conditions; such as the minimum amount of room in which to move the trench away from the river in the vicinity north of monitoring well CH04; or the probable existence of higher permeability "sand stringers" next to the river acting as preferred pathways for increased river recharge into the trench.

Although the use of well points may be feasible (if appropriately field demonstrated) for use at the site, the use of well points was not considered in calculations and cost estimates in the Feasibility Study for the groundwater collection system for the following reasons:

1. A maximum individual well point yield ranging from 0.04 to 0.34 gpm was calculated assuming a saturated aquifer thickness of 10 feet, 100 percent efficiency which means a drawdown at the well of 6.7 feet, a range of hydraulic conductivity of 1 X 10 -3 to 1 X 10 -4 cm/sec, and an effective well point radius of 0.5 feet. It was also assumed that steady-state conditions were reached after 1 year of pumping. The amount yielded by an individual well is very small given the above-named assumptions. Of these assumptions, site

specific conditions may yield an even smaller pumped volume per minute from each individual well point:

- Saturated thickness, at the time of the investigation, varies from about 5 to 10 feet. Seasonal variations may decrease saturated thickness, and therefore well yield, to an even lower value. Eventually the aquifer may "dry up" during some seasonally low recharge periods. Operation and maintenance is high for a system that is periodically "sucking air." As a result increased operation and maintenance costs and performance problems may be encountered.

- The radius of influence cannot be accurately calculated for such a dynamic system. Because contaminant source material remains, capture of all contaminated groundwater before it reaches the river must be assured.

For these reasons, it was determined that a collection trench would be a more "robust" or certain and dependable method of intercepting and collecting all contaminated groundwater that is being generated at the Fort Wayne site.

Comment #34:

A significant advantage of proceeding with initial construction, without the ground water collection and barrier systems, is that only minimal construction will then be required within the flood plain. This will reduce, and possible eliminate, the very time consuming Corp of Engineer permitting process.

The Corps of Engineers permit process will require review of final design drawings, will likely involve their input into design modifications, resulting in redesign. This could easily delay the project by twelve months or more.

EPA Response:

As previously stated, the RI findings indicate that a release of contaminated groundwater above the ARAR (acute water quality standards for the protection of aquatic life) is occurring. Therefore the collection of groundwater on the western portion of the site is necessary to mitigate the release. The optimum location for the groundwater collection system is downgradient of the waste area and subsequently construction within the floodplain cannot be avoided. As construction within the floodplain is considered part of the on-site remedial action for this site, Section 121(e)(1) of SARA would apply. This provision specifically states that: "No Federal, State or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section."

Although obtaining a permit would not be required, compliance with the substantive portions of a "permit" is required. Therefore, consultation with those Federal and State agencies responsible for reviewing plans involving construction within a floodplain is also unavoidable.

Comment #35:

It is important to note that the residual ground water migration to the river will be naturally air stripped once it enters the river. This will remove the volatile organics as demonstrated by the EPA river sediment sampling which show little or no volatile contamination from past seepage. Thus, with respect to the volatile organics, the natural flow regime accomplishes the same purpose as the collection and treatment system.

EPA Response:

The "natural flow regime" is considered a form of dilution. Although State water quality standards allow for use of a mixing zone when assessing chronic impacts of a discharge, thus some dilution is considered acceptable, they do not allow use of a mixing zone when assessing acute impacts. Even though river quality is not projected to exceed the chronic water quality standards outside the mixing zone, the groundwater and groundwater seeps entering the mixing zone are exceeding the acute water quality standards for the protection of aquatic organisms. Therefore, groundwater collection is necessary to mitigate this problem.

REGULATORY ISSUES

Comment #36:

I would like a copy of how much money the EPA collects from the owners of the landfill and generators of the waste. If the owners of the property do not have to pay for the cleanup then they should be denied permits to operate and expand landfills and dumps.

EPA Response:

EPA is currently negotiating with the PRPs on the costs incurred as a result of past response activities at the site (e.g. RI/FS) and performance of the site cleanup. As negotiations are not finished, a copy of how much money EPA collects from the PRPs is unavailable at this time. When negotiations are completed, EPA will either have a settlement with the PRPs, will issue an order compelling cleanup, or will proceed with the cleanup using Superfund dollars. If a settlement is reached with the PRPs, EPA and one or more of the PRPs will sign a consent decree. The consent decree will define the terms of the settlement (e.g. How much money EPA will collect on past costs? Will the PRPs perform and pay for the site cleanup?). Prior to filing the consent decree in court, EPA will provide an opportunity for public comment on the consent decree. At this time, no information would be available on the amount of money EPA collects from the PRPs. If EPA had to perform the site cleanup with Superfund dollars, EPA could pursue a cost recovery action in court against the PRPs. The outcome of the cost recovery action would determine the amount of money EPA would collect from the PRPs.

As pointed out above, EPA is currently negotiating with the PRPs to perform the cleanup at the site. EPA may or may not reach a settlement with the PRPs. EPA does not currently possess the legal authority to deny any of the PRPs a permit to operate and/or expand another landfill based on their willingness to perform the site cleanup.

Comment #37:

Due to economics, a partial cleanup will allow the "cleanup" of additional sites, but then the Fort Wayne Reduction site will continue to contaminate the environment. It seems reasonable to expect that once a superfund site is cleaned up (even if partially), it will be a long time before the EPA will consider this site for a subsequent cleanup.

EPA Response:

Although EPA's preferred alternative will leave contaminated materials at the site, implementation of the various components in EPA's preferred alternative will reduce contaminant exposure to levels protective of human health and the environment. As a result, EPA's preferred alternative achieves the level of protection intended for a final cleanup. To ensure EPA's preferred alternative remains protective of human health and the environment, EPA is committed to meeting the following requirements of SARA Section 121 (b)(2)(c):

- The Agency shall review the remedial action no less often than each 5 years after the initiation of the remedial action to assure that human health and the environment are being protected by the remedial action being implemented.
- In addition if upon review, it is the judgment of the Agency that further action is appropriate, the Agency shall take or require such action.

Comment #38:

It is our understanding that the owners of the landfill are responsible for the cleanup. If this is not the case please let us know. If they are indeed responsible, we feel that no permits should be given for them to continue operation at any site they own until this one is cleaned up completely.

EPA Response:

As specified by Section 107 (a) of CERCLA, not only owners but also operators, generators and transporters can be held liable for the cleanup costs at a site.

As stated previously, EPA is currently negotiating with the PRPs to perform the cleanup at the site. EPA may or may not reach a settlement with the PRPs. EPA does not currently possess the legal authority to deny any of the PRPs a permit to operate and/or expand another landfill based on their willingness to perform the site cleanup.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
NANCY A. MALOLEY, Commissioner

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317-232-8603

Mr. Valdas V. Adamkus
Regional Administrator, Region V
U.S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, Illinois 60604

Re: Record of Decision
Fort Wayne Reduction
Fort Wayne, Indiana

Dear Mr. Adamkus:

The Indiana Department of Environmental Management (IDEM) has reviewed the U.S. Environmental Protection Agency's draft Record of Decision. The IDEM is in full concurrence with the selected remedy which includes:

- Construction and maintenance of a fence around the site, except along the river, to protect the soil covers and restrict access to the site.
- Limiting present and future use of the site as well as the installation of wells on the site through deed restrictions.
- Installation and maintenance of a soil cover in compliance with Indiana Subtitle D - solid waste landfill requirements over the eastern portion of the site to prevent erosion resulting in direct contact with, or washout of, wastes to the Maumee River.
- Monitoring groundwater on the eastern portion of the site to ensure migration of groundwater to the Maumee River does not pose a threat to the river.
- Installation and maintenance of a groundwater collection system on the western portion of the site to protect the Maumee River from the migration of groundwater into the river at unprotective levels.
- Provisions for the removal of contaminants from the collected groundwater through treatment.
- Excavation of the area defined as Area C in the western portion of the site to remove an estimated 4,600 drums containing liquids.
- Installation of a vertical barrier to minimize the inflow of groundwater and migration of contaminants.

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- Incineration of liquid drum contents.
- Reconsolidation of the soils and waste excavated during the drum removal.
- Installation and maintenance of a soil cover in compliance with the "hybrid" closure requirements outlined in the Record of Decision Summary on the western portion of the site.
- Provisions for and maintenance of flood protection measures for that portion of the site within the 100-year floodplain.
- Compensation for any loss of wetlands due to remedy construction by enhancing an on-site wetlands.

Our staff has been working closely with Region V staff in the selection of an appropriate site remedy and is satisfied the selected remedy adequately addresses the protection of public health, welfare and the environment with regard to the Fort Wayne Reduction site.

Please be assured the IDEM is committed to accomplish cleanup of all Indiana sites on the NPL and intends to fulfill all obligations required by law to achieve that goal.

Sincerely,

Nancy A. Maloley

Nancy A. Maloley
Commissioner

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FORT WAYNE REDUCTION

TITLE	AUTHOR	DATE	PAGES
Complaint in Case #F86-72	SCA v.Thomas, et al	00/00/00	29
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Preliminary Assessment	RStJohn-Ecol. & Envir.	83/07/25	6
Conclusion on Well Data	DHopkins - USEPA	84/06/14	1
PRP Position on Water Samples	J. Rhodes - SCA	84/07/27	1
Supervision of SCA Sampling of Monitoring	R.St.John - Ecol.& Envir.	84/08/20	1
Intention to Sample all Monitor Wells	WSchubert-Indiana Waste Sys.	84/11/09	1
Survey of Contaminant Levels Sediments & Biota of St. Mary's, St. Joe's & Maumee River	DHudak-U.S.Dept.of Int.	85/02/25	13
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Hydrogeologic Assessment and Closure Plan	Atec - Grillo & Weaver	85/05/00	256
Offer to Negotiate on RI/FS Consent	C. Lowan - SCA	85/07/05	2
Settlement Negotiation Letter	C. Lowan - SCA	85/07/19	2
Work Plan for Community Relations Planning	J.Hawthorne - [illegible]	85/08/00	8
Consent Order	T.Daggett - USEPA	85/08/21	19
Letter re: River Widening Project by Allen Co.	GPott-HARZA Eng. Co.	85/09/10	4
PRP Protest Letter re: 106 Order	JBernstein - SCA	85/09/18	3

FORT WAYNE REDUCTION

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Meeting with private citizen	C. Lynch - I.S.B.H.	85/12/16	2
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Letter to Residents with private well sampling results	CNolan - USEPA	86/02/10	5
Report - Well Decommissioning & Soil Borings	Grillo & Weaver - ATEC Assoc.	86/03/10	8
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QAPP	CH2M Hill	86/08/20	125
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Response to comments and recommendations on the RI/FS Work Plan for the Fort Wayne Reduction Site	Favero to Gridalauski-EPA	86/09/04	4
Phone Memo. - Removal of Drums	W. Ruddy - USEPA	86/09/08	1
RI/FS Statement of Work	USEPA	86/09/13	14
Work Plan Revision Request #1, RI/FS Phase II	USEPA	87/01/00	30
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Follow-up to Phase II RI Work Plan	C.Grigalauski - Waste Mgmt.	87/03/27	2
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TITLE	AUTHOR	DATE	PAGES
Fact Sheet	Gasior & Ruddy - USEPA	87/04/00	2
QAPP - Phase II, Addendum II	CH2M Hill	87/04/21	125
Response to comments on Phase II RI Work Plan	Ruddy - USEPA	87/05/05	2
Work Plan Revision Request #2	USEPA	87/07/20	12

ADMINISTRATIVE RECORD INDEX UPDATE
Ft. Wayne Reduction Site
Indiana

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	13	84/12/11	Waste Management, Inc. comments on HRS package	Schubert of Waste Mgt. Inc.	Wyer, USEPA	Correspondence
	1	87/03/27	Letter requesting the addition of Martin's Landfill to the Fort Wayne Reduction RI/FS	Stumps of the Izaak Walton League	Adamkus, USEPA	Correspondence
	1	87/04/14	Letter responding to the Stumps' request	Constantelos, USEPA	area residents, Stumps	Correspondence
	2	87/12/31	Letter requesting Indiana State ARARs	Adamkus, USEPA	IN Dept.of Env.Mgt.	Correspondence
	4	88/01/06	Generic PRP Notice Letter sent to BF Goodrich Co., New Haven Wire & Cable Co., Tokheim Corp. and Waste Mgt., Inc.	Gade, USEPA	see title field	Correspondence
	1	88/01/15	Letter transmitting RI Report to repository	Gasior, USEPA	Allen Cty. Public Library	Correspondence
	1	88/01/15	Letter transmitting RI Report to repository	Gasior, USEPA	New Haven Pub.Library	Correspondence
	~~1~~	~~88/01/22~~	~~Generic Letter to PRPs~~ informing them of date change for PRP meeting mentioned in Notice Letter of 1-6-88	Schorle, USEPA	PRPs	Correspondence
	7	88/02/24	Letter conveying Indiana State ARARs	Maloley, IN Dept.of Env.Mgt.	Adamkus, USEPA	Correspondence
	3	88/03/15	Letter to US Dept. of Interior from USEPA re: Maumee River Sediments	Dikinis, USEPA	Hudak, US Dept. Interior	Correspondence
	7	88/04/07	Letter to USEPA from US Dept. of Interior re: Maumee River Sediments	Hudak, US Dept. of the Interior	Gade, USEPA	Correspondence
	4	88/04/28	Generic PRP Notice Letter	Gade, USEPA	PRPs	Correspondence
	1	88/03/00	RI Availability Sessions	Gasior, USEPA		Fact Sheet

ADMINISTRATIVE RECORD INDEX UPDATE
Ft. Wayne Reduction Site
Indiana

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
			Schedules for Ft.Wayne Reduction site Fact Sheet			
	4	88/03/00	Fort Wayne Reduction Superfund Site Fact Sheet, Winter 88	Gasior, USEPA		Fact Sheet
	2	88/02/02	Agenda and sign-in sheet for 2-2-88 PAP meeting			Meeting Notes
	2	87/03/06	Action memo requesting supplemental RI/FS funding	Constantelos, USEPA	Adamkus, USEPA	Memorandum
	2	87/12/21	Action memo requesting supplemental RI/FS funding	Constantelos, USEPA	Adamkus, USEPA	Memorandum
	2	88/04/07	Notes for Ft. Wayne file re: State support of RI/FS	Carny, USEPA	file	Memorandum
	3	85/01/00	USEPA response to HRS commentors	USEPA		Other
	8	88/03/31	Work Plan Revision Request No. 3 for Ft. Wayne RI/FS	CH2M Hill		Other
	21	84/07/12	Hazard Ranking System Package	Hopkins, USEPA		Reports/Studies
	15	87/12/00	Determination of ARARs	CH2M Hill		Reports/Studies
		88/01/07	Remedial Investigation Report	CH2M Hill		Reports/Studies
		88/05/04	Feasibility Study Report	CH2M Hill		Reports/Studies
	11	88/05/04	Proposed Plan	Carney, USEPA		Reports/Studies

ADMINISTRATIVE RECORD INDEX UPDATE
Ft. Wayne Reduction Site
Ft. Wayne, Indiana

PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
5	88/04/22	Letter to U.S. EPA from PRPs re: Comments on the RI Report	New Haven Wire and Cable Co., SCA Services of Indiana, Tokheim Corp., Uniroyal Goodrich Tire Co.	Carney, U.S. EPA	Correspondence
3	88/05/04	Letter to U.S. Dept. of Interior from U.S. EPA re: Maumee River Sediments	Gade, U.S. EPA	Hudak, U.S. DOI	Correspondence
4	88/05/05	Special PRP Notice Letter	Gade, U.S. EPA	PRPs	Correspondence
14	88/05/24	Agenda and Sign-in sheet for 5/24/88 PRP meeting			Meeting Notes
11	88/05/11	Written statement given at public meeting	Stump, Ft. Wayne Izaak Walton League		Other
61	88/05/11	Transcript of public meeting	Accurate Reporting of Indiana		Other
1	88/05/17	Public comment on FS and Proposed Plan	Baxle, resident		Other
1	88/06/06	Public comment on FS and Proposed Plan	Martin, resident		Other
1	88/06/06	Public comment on FS and Proposed Plan	VanDaele, resident		Other

37	88/06/06	Public comment on FS and Proposed Plan	New Haven Wire and Cable Co., Potlatch Corp., Rea Magnet Wire, SCA Services of Indiana, Tokheim Corp., Uniroyal Goodrich Tire Co.	Other
4	88/06/07	Public comment on FS and Proposed Plan	SCA Services of Indiana	Other
1	88/06/07	Public comment on FS and Proposed Plan	Precision Litho Don Ayres Pontiac	Other
	88/08/00	Record of Decision and Responsiveness Summary		Other